Headquarters U. S. Air Force

Integrity - Service - Excellence

C2 Constellation & ConstellationNet

Col Biff Sturk
Lt Col Rick Painter
Air Force C2 & ISR Center

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Overview

- C2 Constellation…..
  - Integration Quips
  - Vision / Overview / Purpose
  - Attributes
  - Who's working it
- Constellation Net (ConstellationNet)
- In Context of JOINT BMC2
- How are we doing?
- What's next
- Summary

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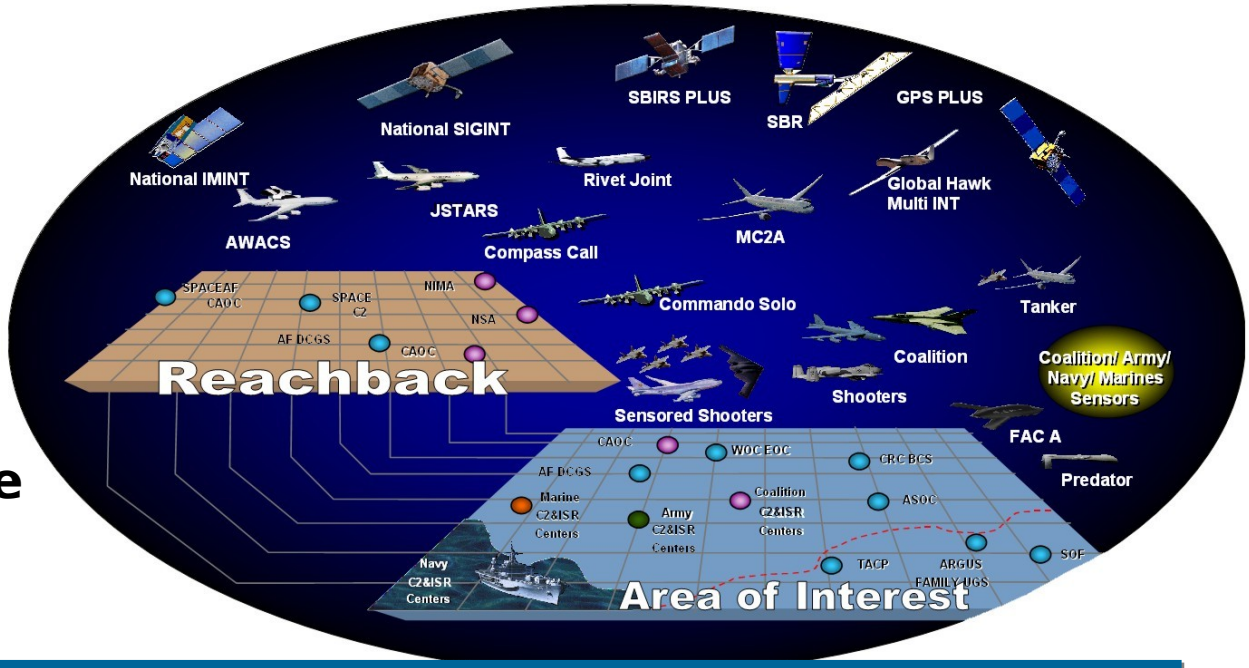
Welcome to C2 & ISR Integration

- Everyone loves integration as long as you integrate with me
- I provide a product and my job is done (but someone else's is just beginning)
- Sometimes four pieces of information are worse than one
- Knowing it's coming doesn't help if it's a Tsunami
- What's a pound of Command and Control or ISR worth?
  - And how much does it cost?
- Our Planning, Programming and Budgeting System (PPBS) = four IT generations (Moore's Law)

Supporting the Warfighter – C2 Constellation Vision

- A Network-Centric Family of Systems
- Seamless Information to Command and Control Forces
- Air / Space / Surface and Manned / Unmanned Vehicle Integration



"The development and deployment of a truly modern and effective command, control, communication, and intelligence system is fundamental to the transformation of the US military forces …. "

— Secretary of Defense Donald Rumsfeld

. . . . and winning wars

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Supporting the Warfighter – CFACC's C2 Constellation

Dominate the Battlespace *Enablers*

★ CC Priorities

C2 Constellation - BMC2 Traits

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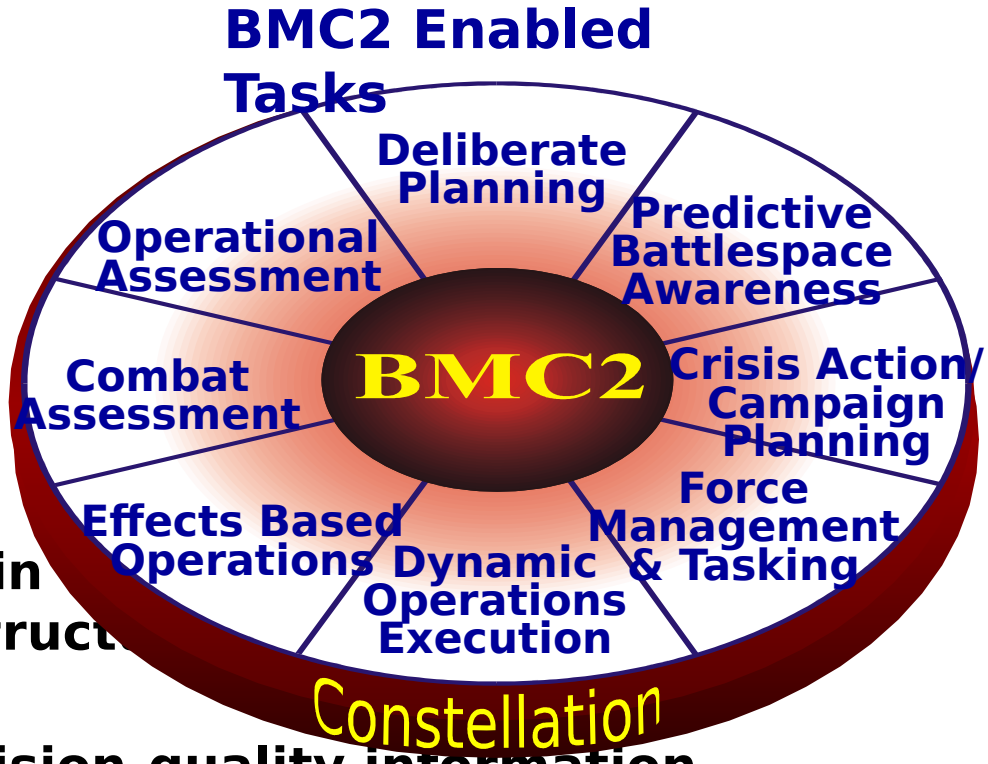
BMC2 is….

- **People executing the AF Space & C4ISR Task Force CONOPS through**
- **C2 processes, achieving Effects- Based Operations & Predictive Battlespace Awareness, enabled by the**
- **C4ISR technology resident in the Network-Centric Infrastruct of the Constellation**
- **Constellation produces decision-quality information**
- **BMC2 creates an intuitive decision making environment**



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Constellation BMC2 Attributes

Effects Based Operations	Space<->Air Air<->Air pace<->Grour Air<->Ground	Information Operations	Dynamic Execution	Net-Centric Agile Combat Support
Predictive Battlespace Awareness	Predictive Intelligence	Collection Optimization	Dynamic ISR	Combat & Tgt ID
ConstellationNet (NCI)	Global Connectivity	GIG Enterprise Services	Machine To Machine	NetOps Doctrine & TTP

Enabling Network-Centric Warfare

C2C Key AF Orgs

- AF/XI, XO, CIO
  - Pentagon advocate
- AFC2ISRC (part of AF/XI)
  - Operational Warfighting Integration Lead
- AFMC (ESC, ASC, SMC)
  - Systems Warfighting Integration Lead
- User MAJCOMs
  - Users & Customers of C2C
  - Provide requirements, inputs
- AFCA
  - Communications Inputs

"We are going to drive interoperability and connectivity into everything we do. It will be integral to every effect we seek to achieve; to every CONOPS, to every architecture, and every capability we build to achieve these effects" (Lt Gen Kenne, *Intercom*, Jan2003)

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ConstellationNet Defined

- **ConstellationNet is the C2 Constellation network and communications infostructure**
  - **Work "on-ramps" to Global Information Grid enabling PBA & EBO**
  - **Transports voice, data, imagery and video information**
  - **JTRS + SATCOM & TDL Roadmap Execution + Transformational Comm + GIG-ES + Standards and Protocols (IPv6) + NetOps**

- **ConstellationNet networks the Air and Space Expeditionary Task Force in a peace and combat information environment**
  - **Enable horizontally integrated C4ISR and M2M information exchanges supporting finders, deciders, shooters, and movers**
  - **Provide warfighter expanded information sharing, situational awareness, information protection and combat lethality**
  - **Capability baseline for transformation of airpower operations**

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Net Centric Operations

- **Networked Air & Space Power**
  - **Sensors, Shooters, Movers, and C2**
- **+ Horizontally integrated C2ISR**
  - **Machine to Machine information exchange**
- **+ Interoperable Data**
  - **XML and Data Tagging**
- **+ Connected Communications**
  - **Waveforms, Wideband, BLOS and IP Addressable Warriors, Weapons and Sensors**
- **= Net Centric Air & Space Operations Capability**
  - **Speed of Command and Precise Control through Effects Based Operations & Predictive Battlespace Awareness**
    - **XI Flight Plan: COP, CID, GIG, ISR**

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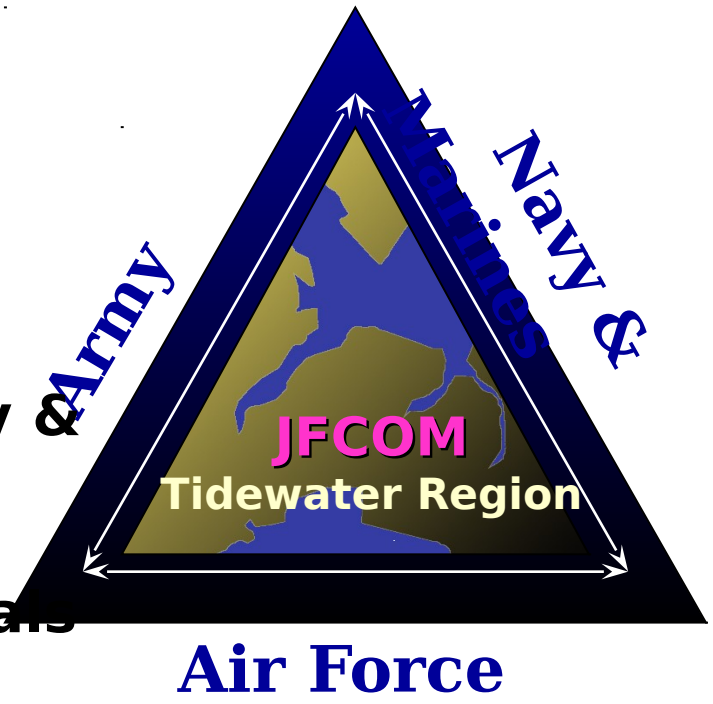
C2 Constellation in context

- Work the AF input from the operations perspective
- Press for integration and interoperability of current, upcoming, and future systems
- Enable Joint Mission Areas
- Support SecDef Interoperability & Connectivity objectives
- Ensure AF C4ISR meets DoD Transformation / Joint BMC2 goals



It's not about platforms, sensors and nodes
It's about supporting the Joint Force Commander by increasing air & space power through information integration

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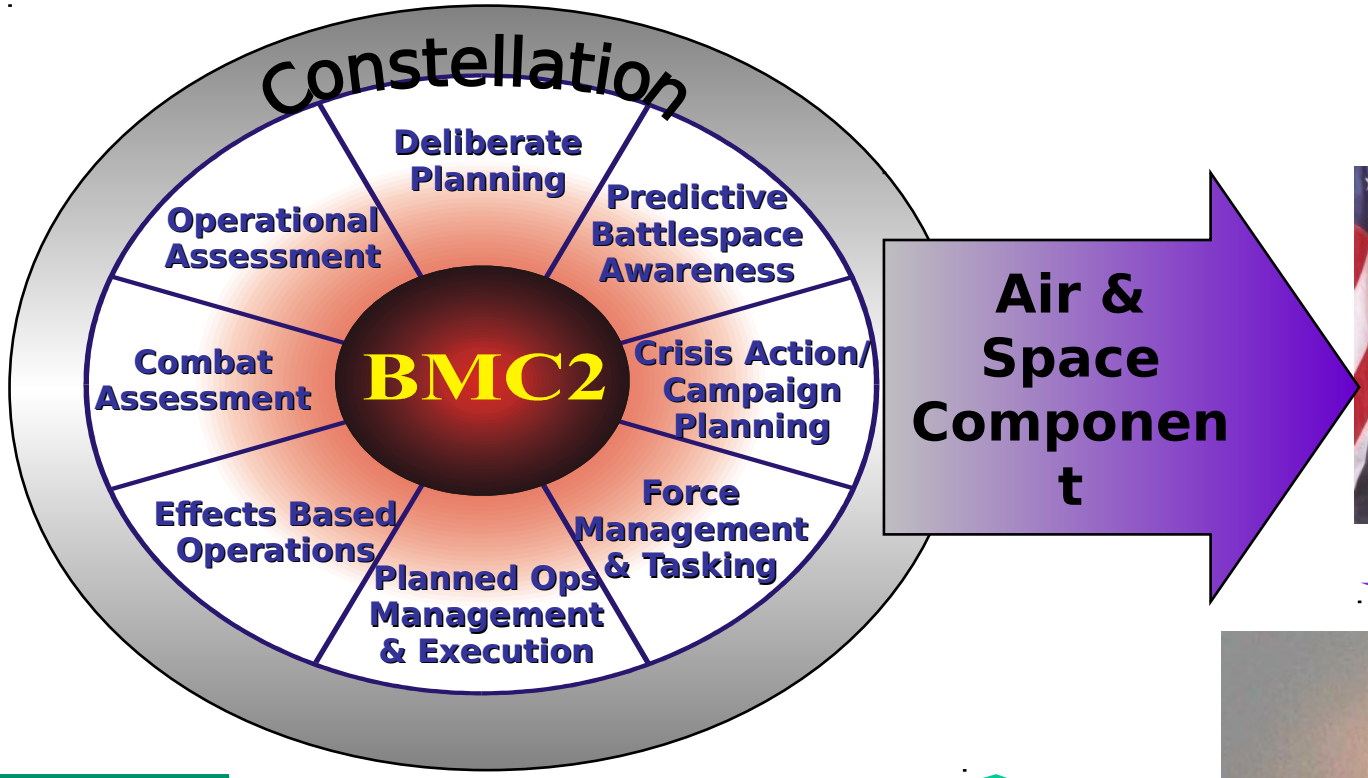
Constellation… JBMC2 Component / Enabler



Air & Space Component

Find

Fix

Track

Target

Engage

Assess

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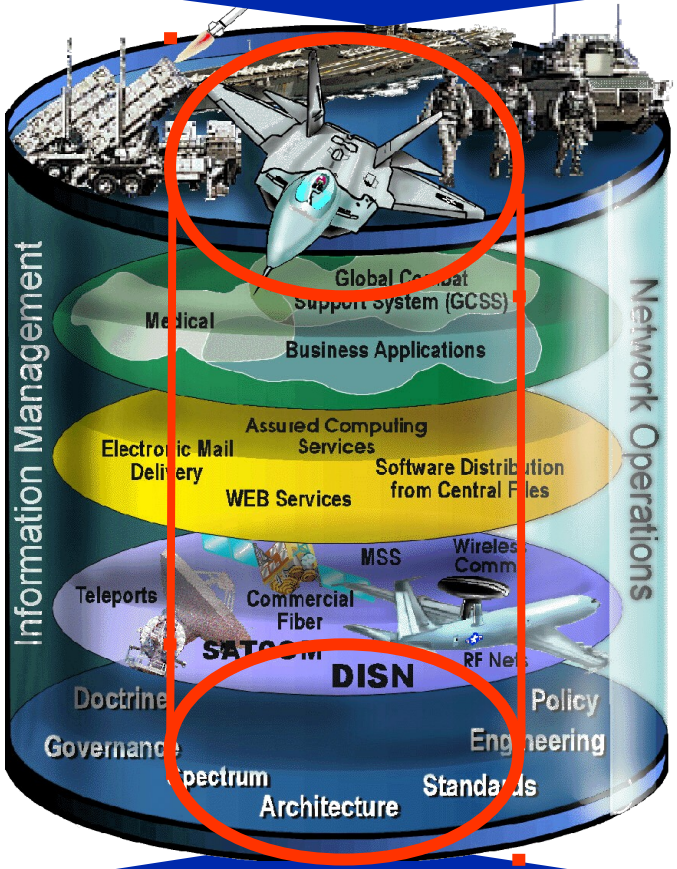
Mapping ConstellationNet and C2 Constellation to the GIG



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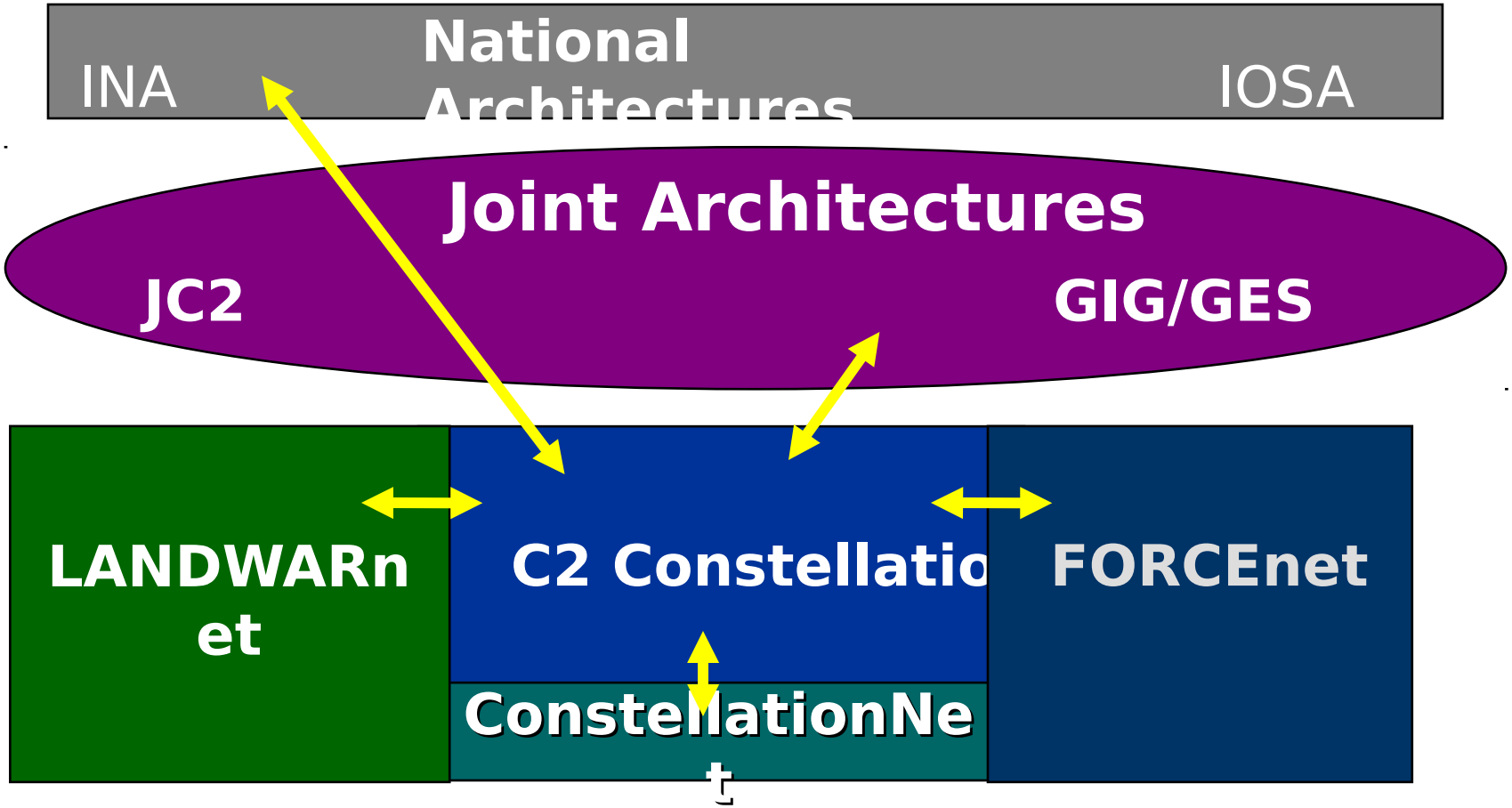
Joint & Cross Service



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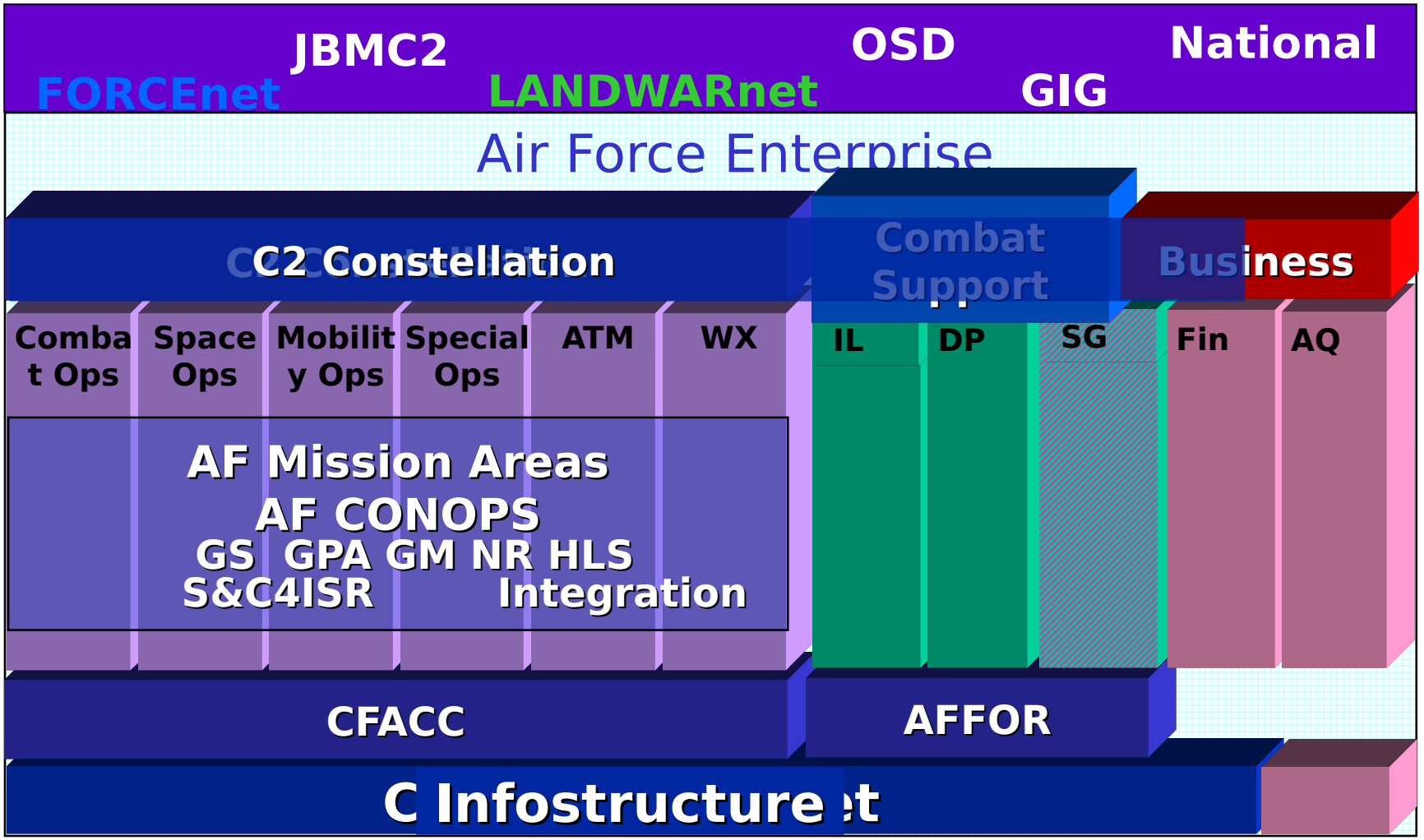
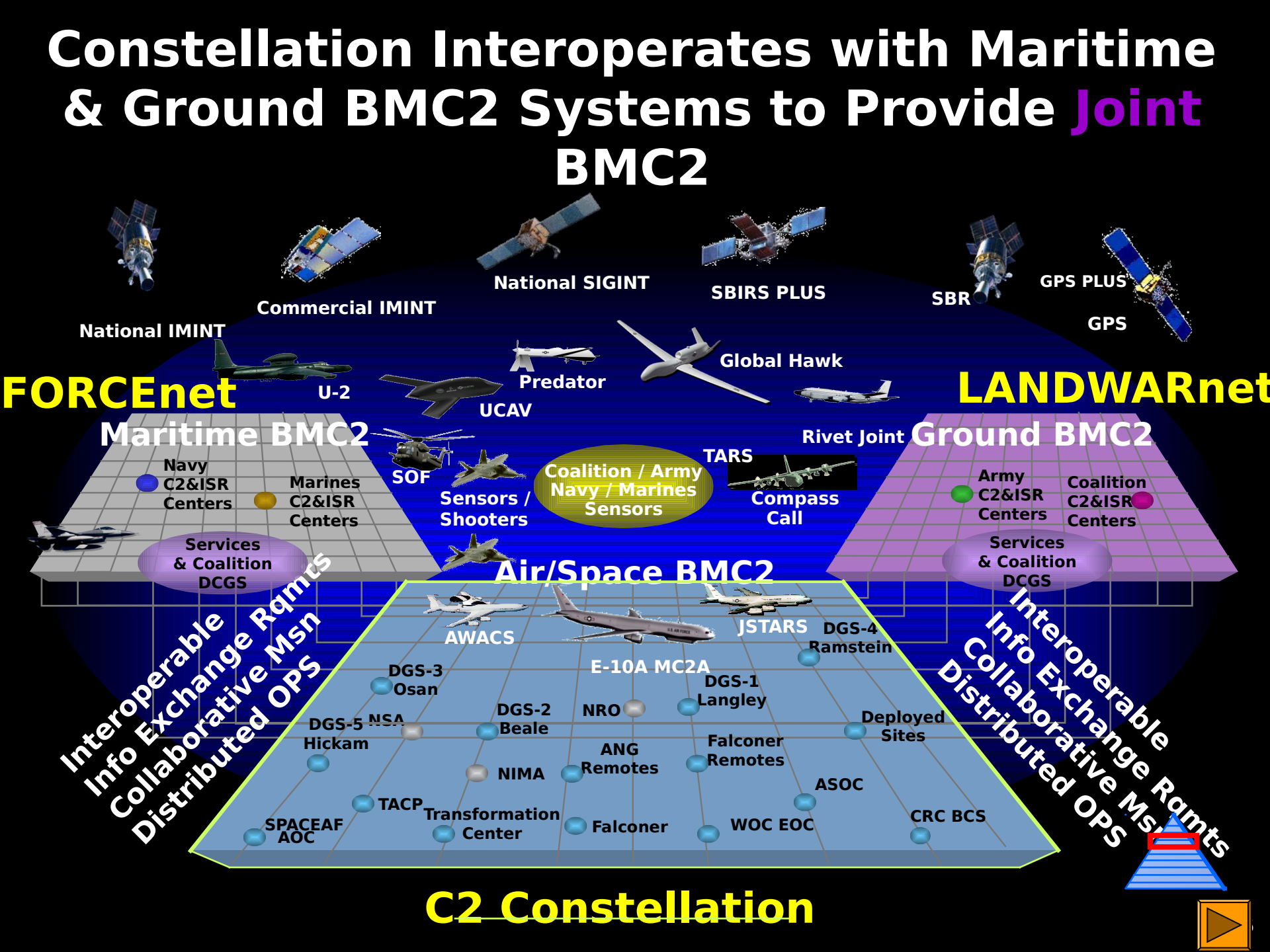
AF C4ISR Structure



Constellation Interoperates with Maritime & Ground BMC2 Systems to Provide Joint BMC2



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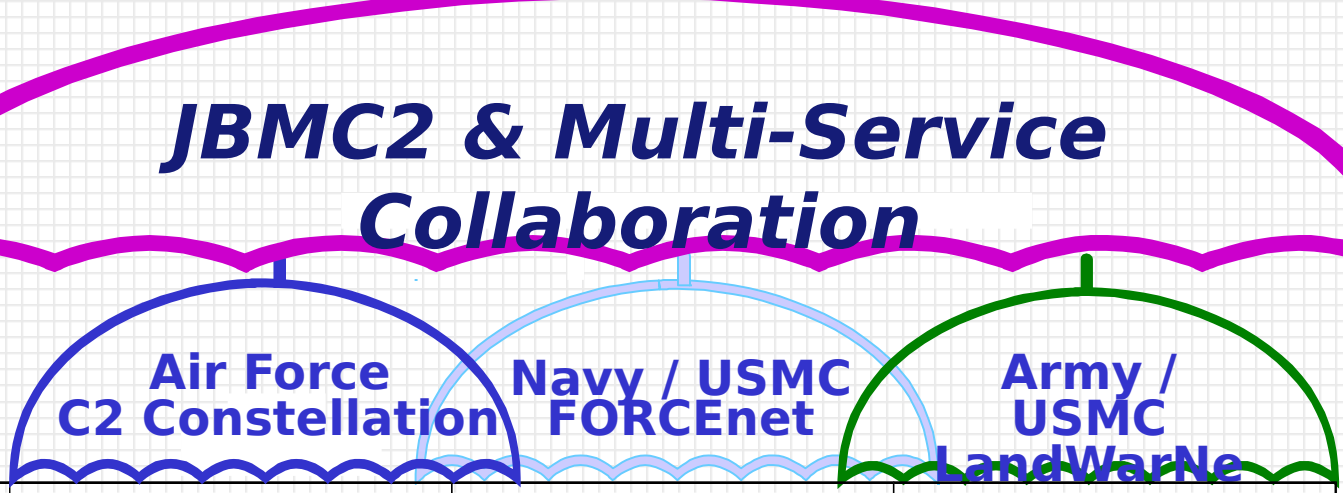
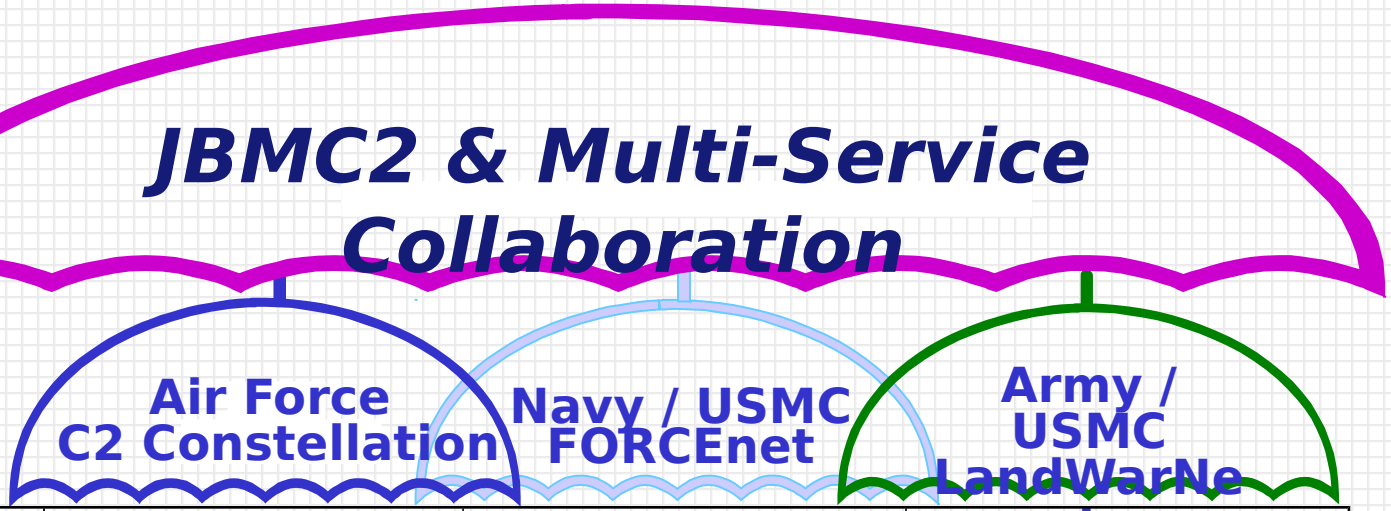
JBMC2 & Multi-Service Collaboration



Initiatives	AFC2ISRC	NNWC	TRADOC Futures Center
MOU-Charter	Multi-Service C4ISR Integration Steering Group & WG		
Architectures	Complete "As Is and To Be" Products	"As Is" OV 1, SV 1. and TV-1	Complete "As Is and To Be" Products
DCGS	DCGS Lead	DCGS 10.2 DIB	DCGS 10.2 DIB
JTRS	Airborne Maritime Fixed		Cluster 1, 5
FIOP & BFSA	SIAP	FORCENET	SIGP
TDL Roadmap	AF & Navy Roadmaps coordinated with common purpose & capabilities		Preliminary
JSF ISR	JSF Interoperabilty Advisory Council		
Multi-Service TTP	MTTP on TST Operations		

JBMC2 & Multi-Service Collaboration



Initiatives	AFC2ISRC	NNWC	TRADOC Futures Center
FCS C4ISR IPT	Member	Member	Lead
E-10 CDD	Lead	CDD Coordination	
AOC & TBMCS IPTs	Lead	Member	Member
DCAPES	JFCOM Lead with Service Participation		
Precision Targeting	Raindrop	PTW	
AJCN ACTD			
NCCT ACTD	JEFX 04 Thread AWACS & RJ	Navy E-2C possible	JFEX-04 Guardrail
FutureGame 04	Lead Assess; players	Players/Assessors	Players/Assessors

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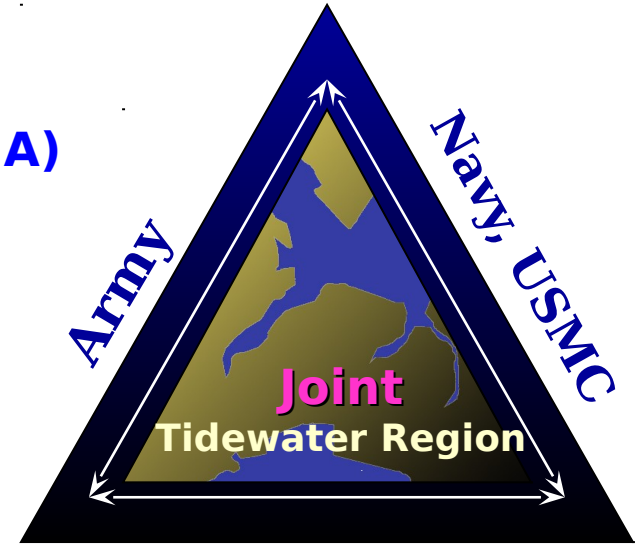
C2 Constellation Status

- CONOPS / ICD
- Architecture
- Operational Interoperability Analysis (OIA)
- FY03 Horizontal Integration Initiatives
- Spiral Development
- Experimentation (LOEs, JEFX, JFCOM)
- Wargames (FutureGame 04)
- Joint / Multi-Service Relationships
  - Joint JBMC2
  - Navy FORCEnet
  - Army LANDWARnet



"We are going to figure this out. We are going to figure out how to have conversations between airborne platforms, unmanned, on the ground, in the air. We'll build a constellation that marries up the manned and the unmanned. Create that network in the sky that will pass the information around." General John Jumper, CSAF

Net Centric Way Ahead

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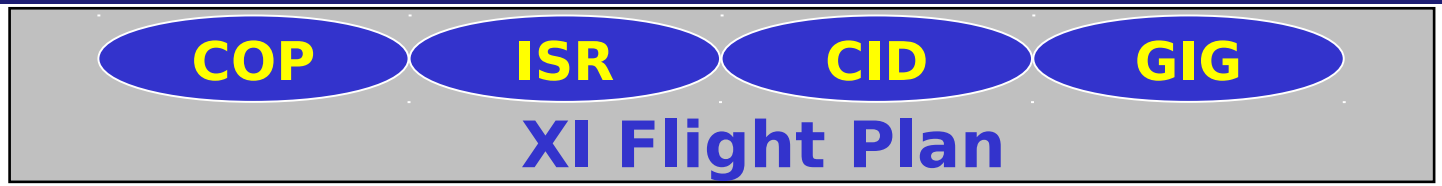

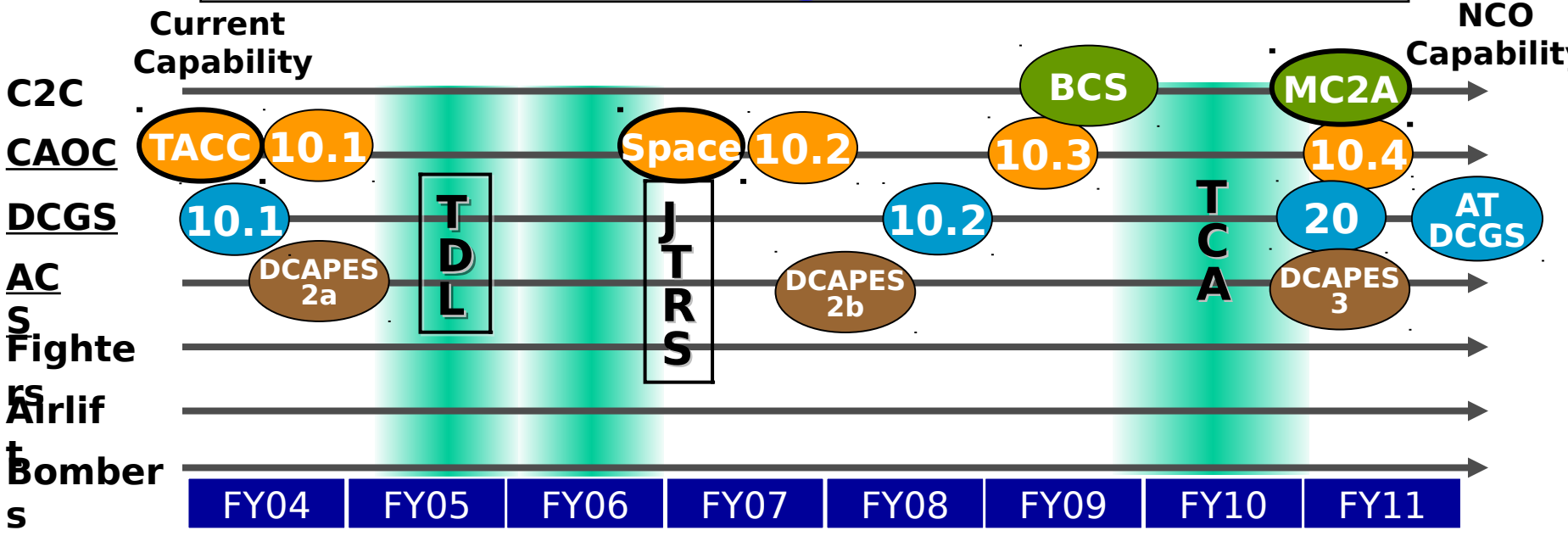

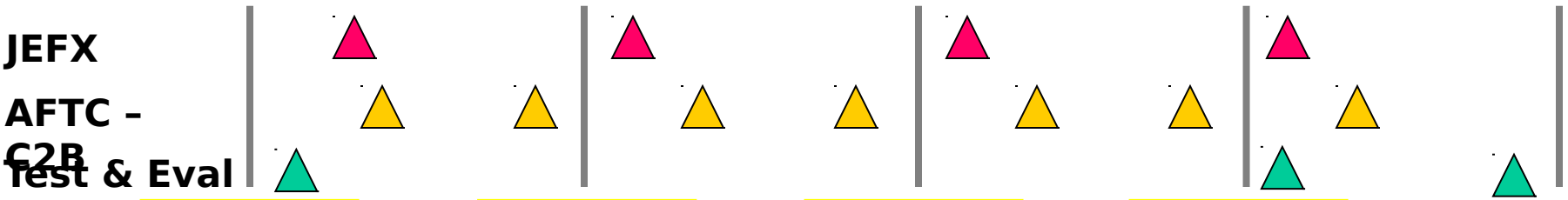

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Network Centric Operations Defining Capabilities

- **Initial Capability (2008):**
  - Networked sensors + networked shooters + networked C2
  - Data interoperability through XML and data tagging
  - Portal access for C2ISR nodes
  - Blue Force Tracking COP input
  - Double digit minutes kill chain execution & assessment
  - Machine to machine information exchanges

- **Interim – 2011 / Full – 2017:**
  - Network of sensors, deciders and shooters, & weapons
  - On-demand combat information query, push / pull (publish / subscribe)
  - IP Addressable warriors, weapons and sensors
  - Commanders' shared awareness / knowledge through collaboration and a common operational picture
  - Single digit minutes kill chain execution & assessment
  - End to End machine to machine kill chain execution

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Net Centric Way Ahead

- **Define the net centric end state**
  - **Many answers, we need one with corporate AF buy in**
  - **Coherent criteria for net centric air operations (that engineers understand as their starting point)**
- **Documentation Way Ahead**
  - **Flight Plans and Investment Strategy**
- **Governance will be key**
  - **“Certification of Net Worthiness”**
- **Organization: Ensure USAF postured to achieve NCW capabilities with joint & coalition partners**
  - **Ensure clear roles (XI – XO – XP – AFMC – ACC…)**
  - **Air Staff – MAJCOM NCO HPT/GOSG chart NCO way ahead**
- **Bottom Line: Build the Pyramid!**

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Way Ahead: Build the Pyramid

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AFC2ISRC Architecture Projects

- **CX**
  - **C2 Constellation Architecture**
  - **JEFX04 Architecture**
  - **AOC WS “To Be” Architecture**
  - **ISR Architecture**
  - **MG Crawford NCI Roadmap Tasker**
  - **AF/XIWS GIG Roadmap Support**
  - **JBMC2/CSAWG**
  - **Arch 101**
  - **Infostructure Architecture**

AF C4ISR Archs Structure

(vis-à-vis the ARCH COUNCILS)

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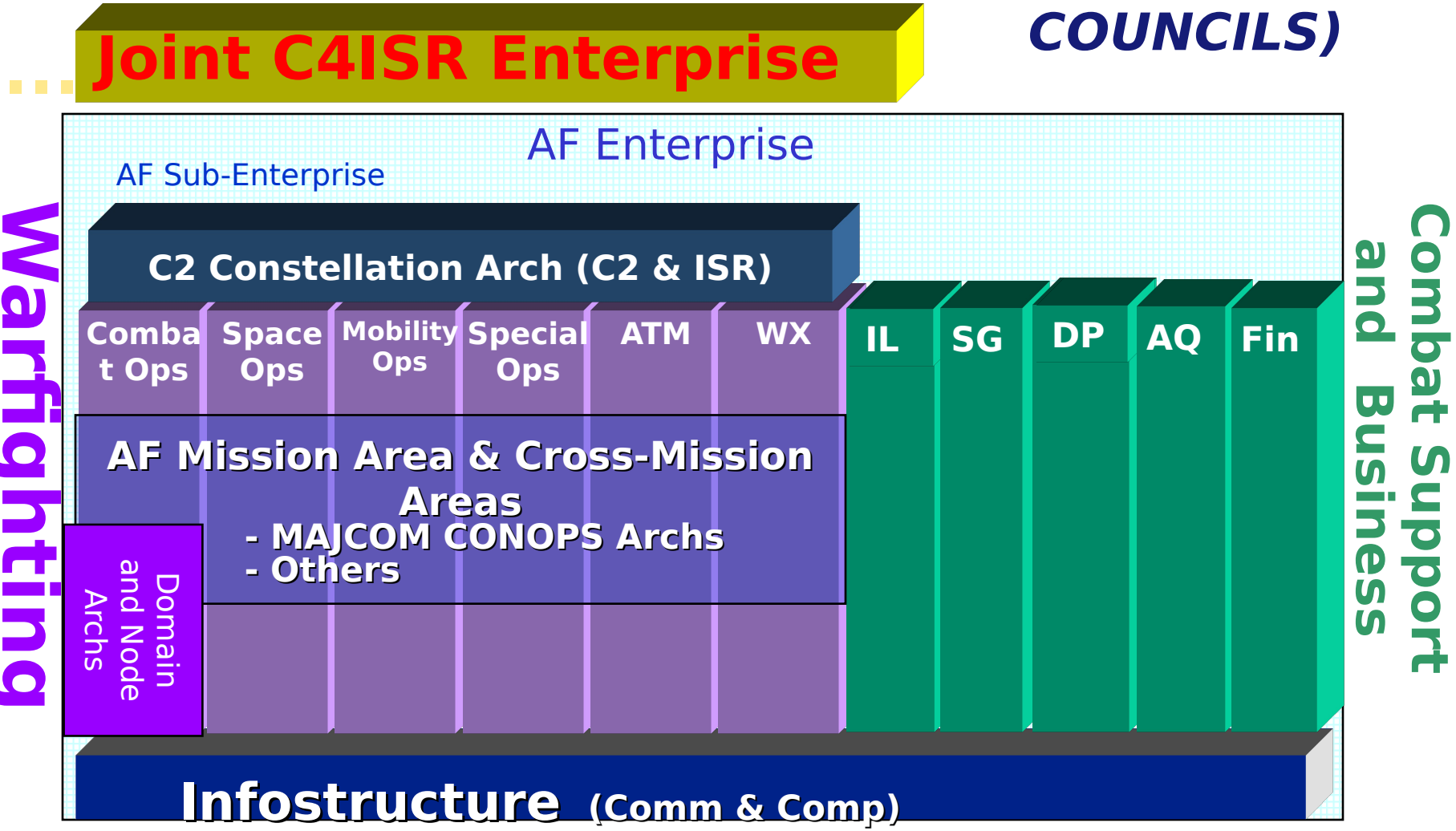

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C2 Constellation Architecture Roadmap

- Far Term – Vision
- Assess Plan / Execute (Monitor)
- Air Force Nodes
- “Stage Setter”(Broad / Shallow)
- MS Access

- Near / Mid / Far Term
- Monitor / Assess / Plan / Execute
- Joint Air & Space Operations + NCOW
- Baseline (Broad / Shallow) + TCT (Thread D
- System Architect - DARS

- Near / Mid / Far Term
- Monitor / Assess / Plan / Execute
- Joint Air & Space Operations
- Baseline + TCT / CID / PBA
- System Architect - DARS

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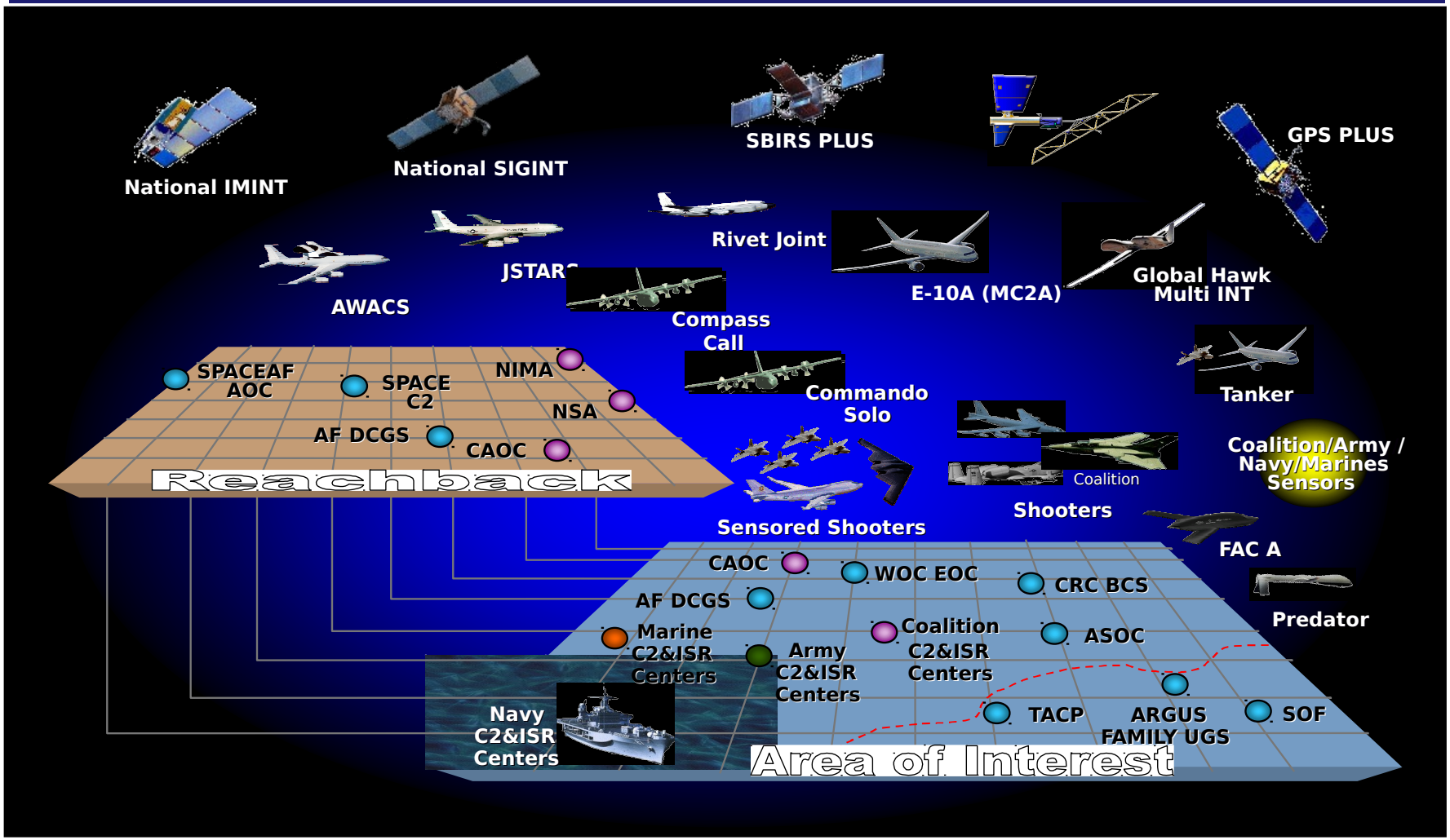
C2 Constellation OV-1



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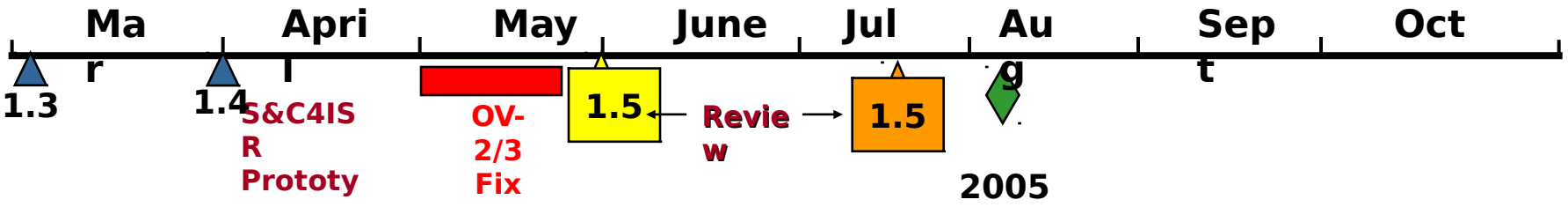
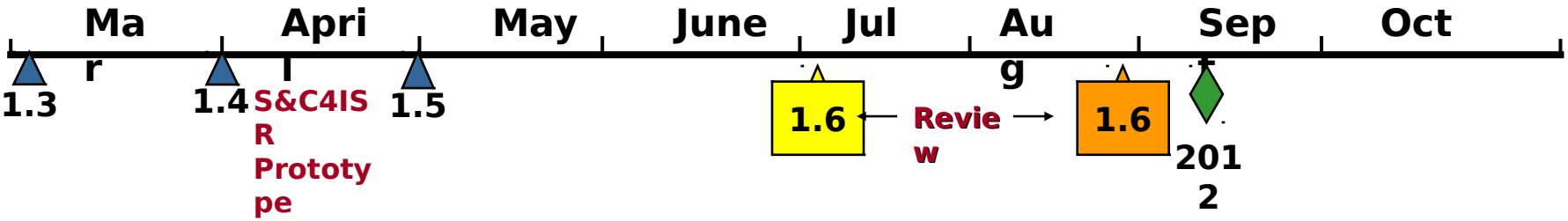
C2 Constellation Baseline Schedule

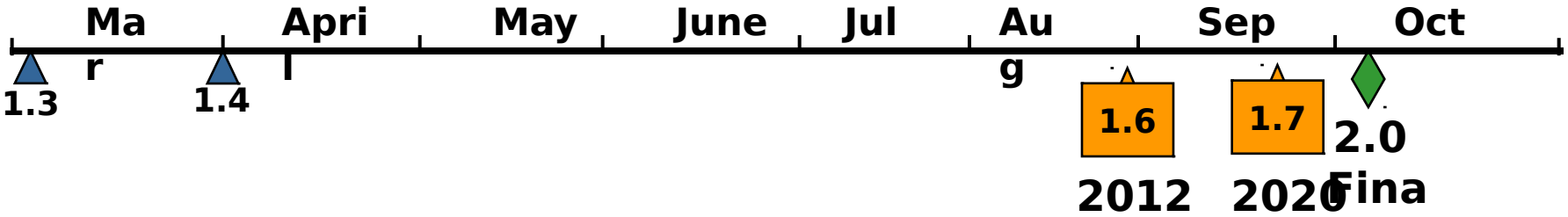
2005



2012



2020



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Integration Of Architectures

- Air Force
  - JEFX04
  - Infostructure Arch.
  - MAJCOM CONOPS Arch (6)
  - Platform / Program (MC2A, AOC WS, AF DCGS, PBA, CID, etc.)
- Naval
  - FORCEnet
  - STOM
- Army
  - Objective Force
- Joint
  - GiG / NCOW
  - JBMC2

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Issues

- Architecture Development Tools
- Formal Validation Process
- Joint & National Collaboration
- DoD Architecture Repository System (DARS)
- Classification of Architectures and Data

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The Operational Interoperability Assessment (OIA)

- **Purpose of the C2 Constellation OIA:**
  - **Garner the C2 interoperability problem space information, categorize it, and identify the subset that are appropriate areas for C2 Constellation initiative efforts to support transformation to network centric operations**
- **Comprehensively identify and prioritize interoperability / integration issues / challenges at the C2 Constellation MACRO level (e.g. INTER-node, not INTRA-node issues).**
  - **Leverage OEF, OIF, JFCOM lesson's learned work**

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The OIA Team

- Program Manager (McKee)
  - Deputy PM (Pfeiffer)
- C2 SME
  - JFACC to JFC, JFACC to Wing / Unit, JFACC to JFLCC, JFMCC, JSOTF
- AWACS / Battle Manager
- ISR (National / Tactical)
- Joint BM/C2 SME
- Army BM/C2 SME
- Various part-time SME as needed (IO, etc)
- Gray-beard Consultants

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The Main Product

- **An accurately characterized C2 Constellation "problem space", including but not limited to a prioritized roadmap / plan of C2 Constellation inter-nodal interoperability / integration areas that need attention.**
- **Baseline nodes from the C2 Constellation architecture team shall be included.**
- **Products shall be consistent with the ongoing C2 Constellation architecture effort.**
- **Roadmap will serve as part of the criteria by which AFC2ISRC will evaluate potential initiatives.**
- **Information shall be provided in a hyperlinked & approved briefing which can be presented in a variety of forums.**

FY03 Initiatives Execution

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- Paul Revere 707
- Machine to Machine Targeting
  - SOF thread, Spiral 1
- NCCT Plus-Up
- NCCT / NRO
- NCCT / Joint Fires Network Integration
- Air-Space Integration (HiGain)
- MAF-CAF Integration
- Blue Force Tracking

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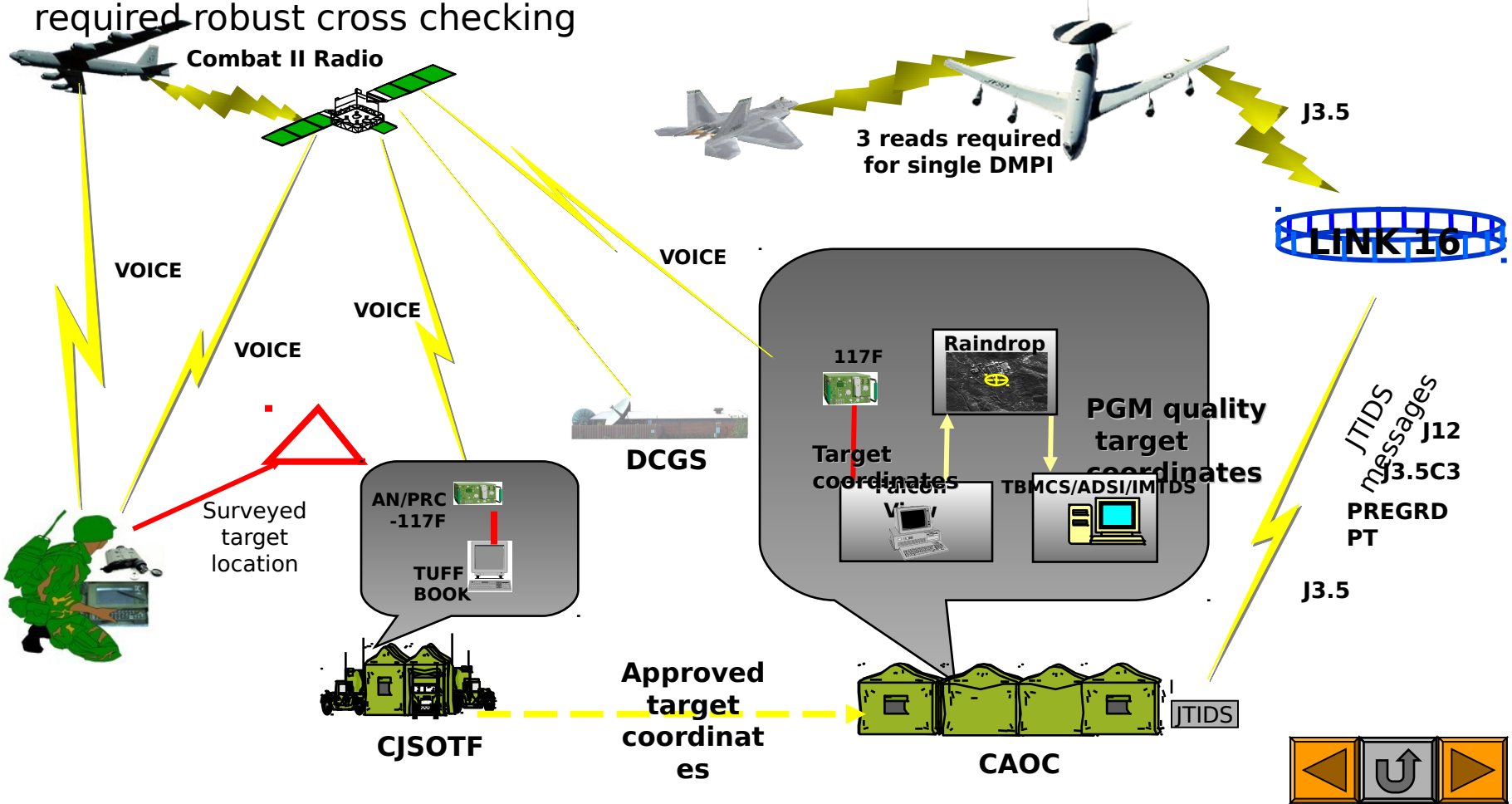
Machine to Machine Targeting Current Capability / Problem

- **Today:** Capability to exchange precise point data throughout theater to support PGM employment is inadequate due to low data rate, voice com, 3 Voice relay per transmission & manual data entry—potential for high re-key error, and required robust cross checking



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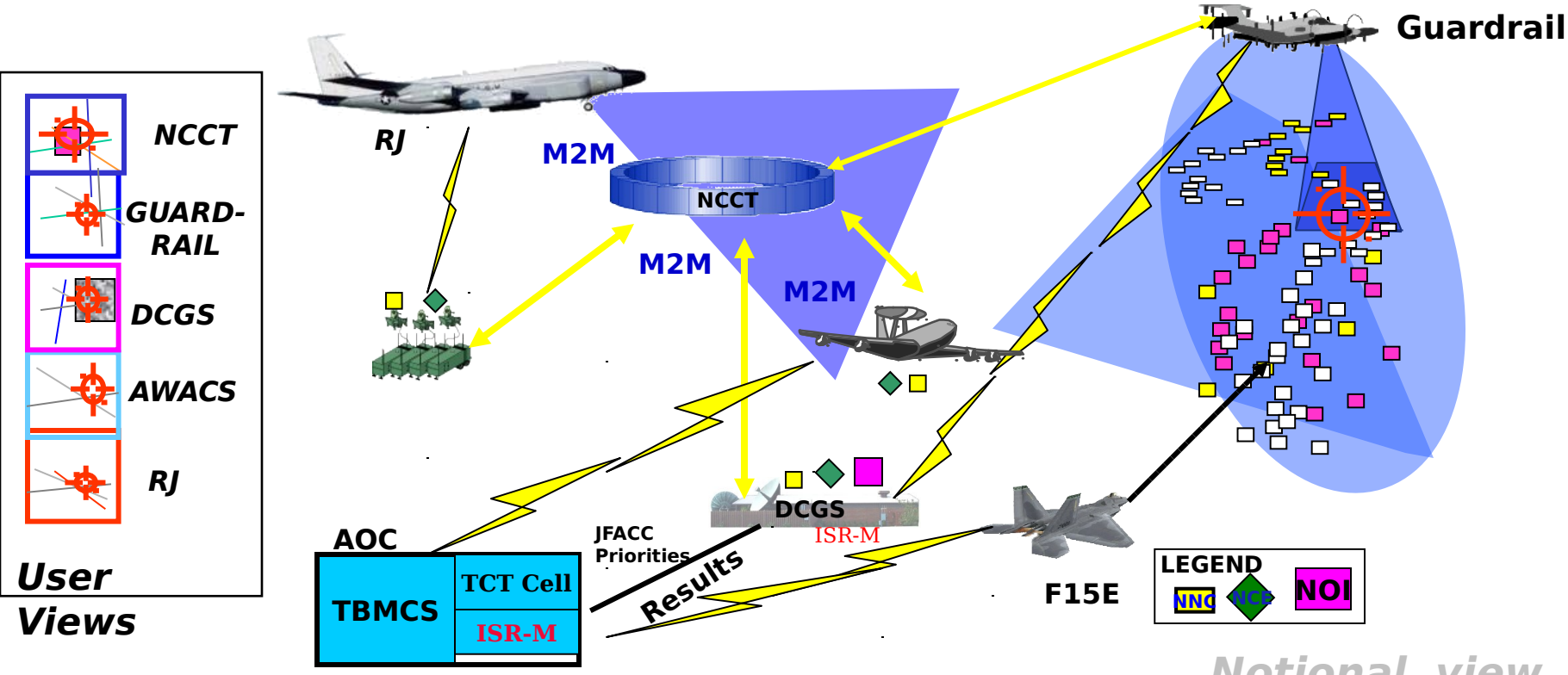
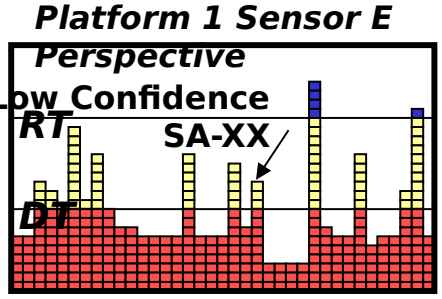
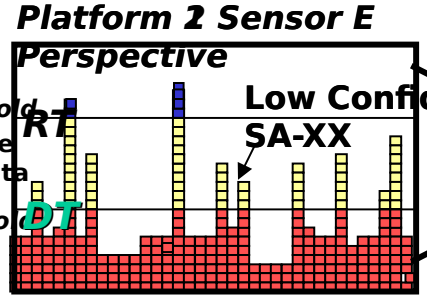
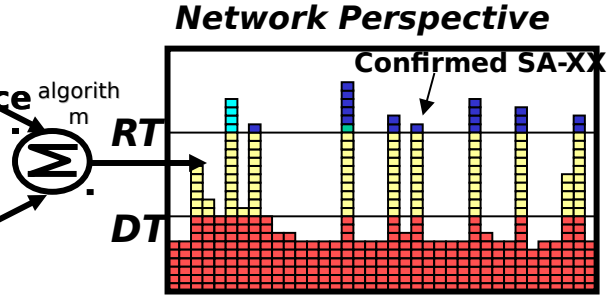
NCCT ACTD Integration (ASC/RA)









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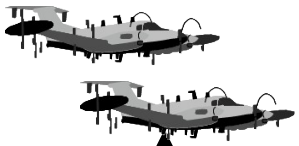
NCCT / AOIO
Cross Network Connectivity
~~(ASC/RA,NRO)~~



Additional Collector(s)

Legacy Point-to-Point Connectivity

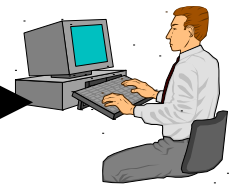
- **AQL, RJ and AWACS ESM to HP**
  - **Tip/Report CMD**
  - **Pulse Data**
  - **Processing Results**
- **HP to AQL, RJ and AWACS ESM**
  - **Geo-Observables Data**
  - **Processing Results**

NCCT Kit

Guardrail Ground Station

IPF Processing

Guard



HP

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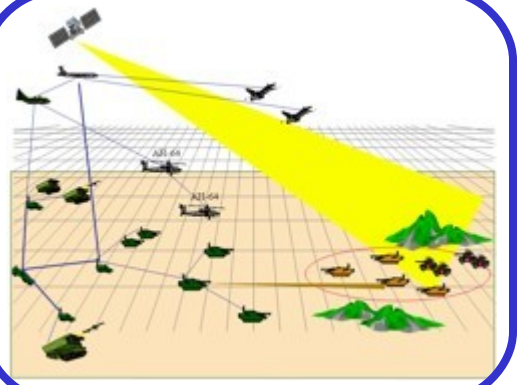
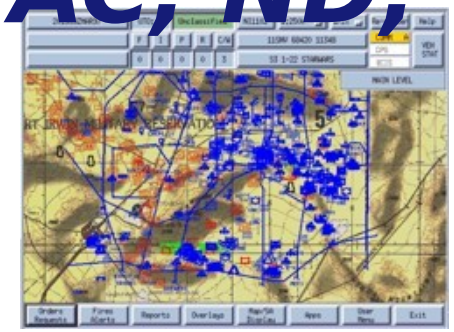
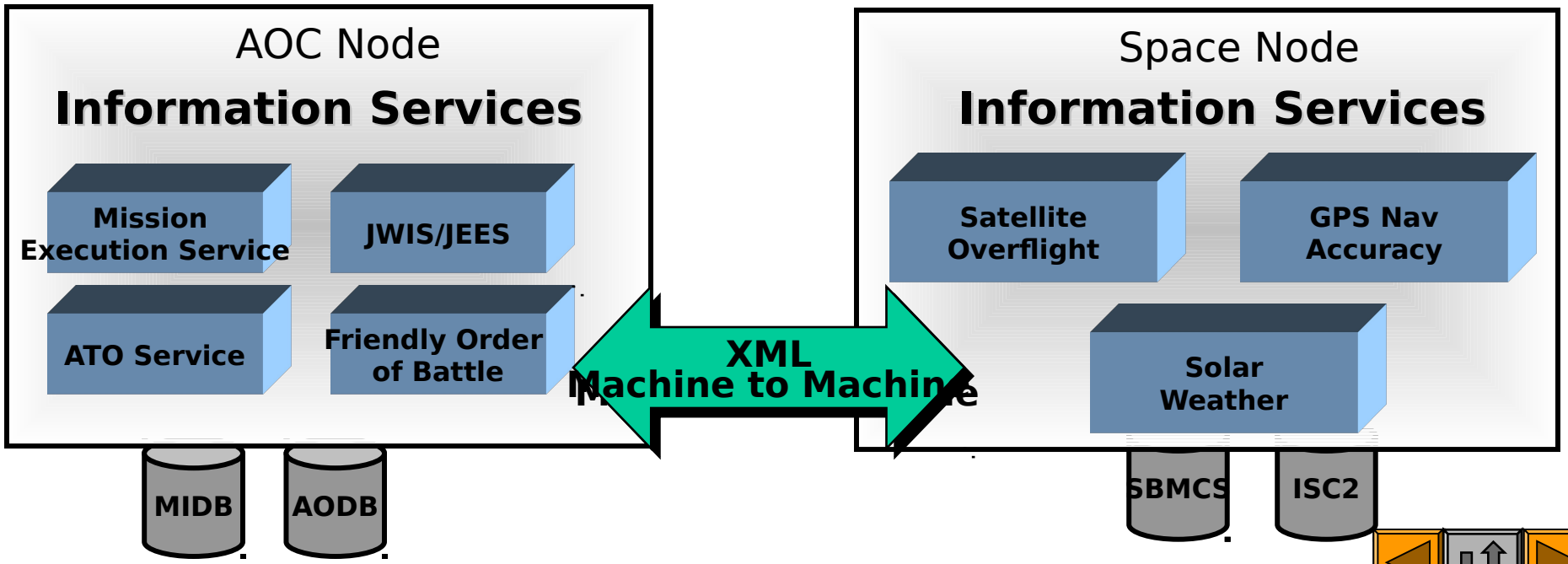
Air & Space Interoperability (AC, ND, CX)



COP with Satellite Overflight



Theater ATO Display



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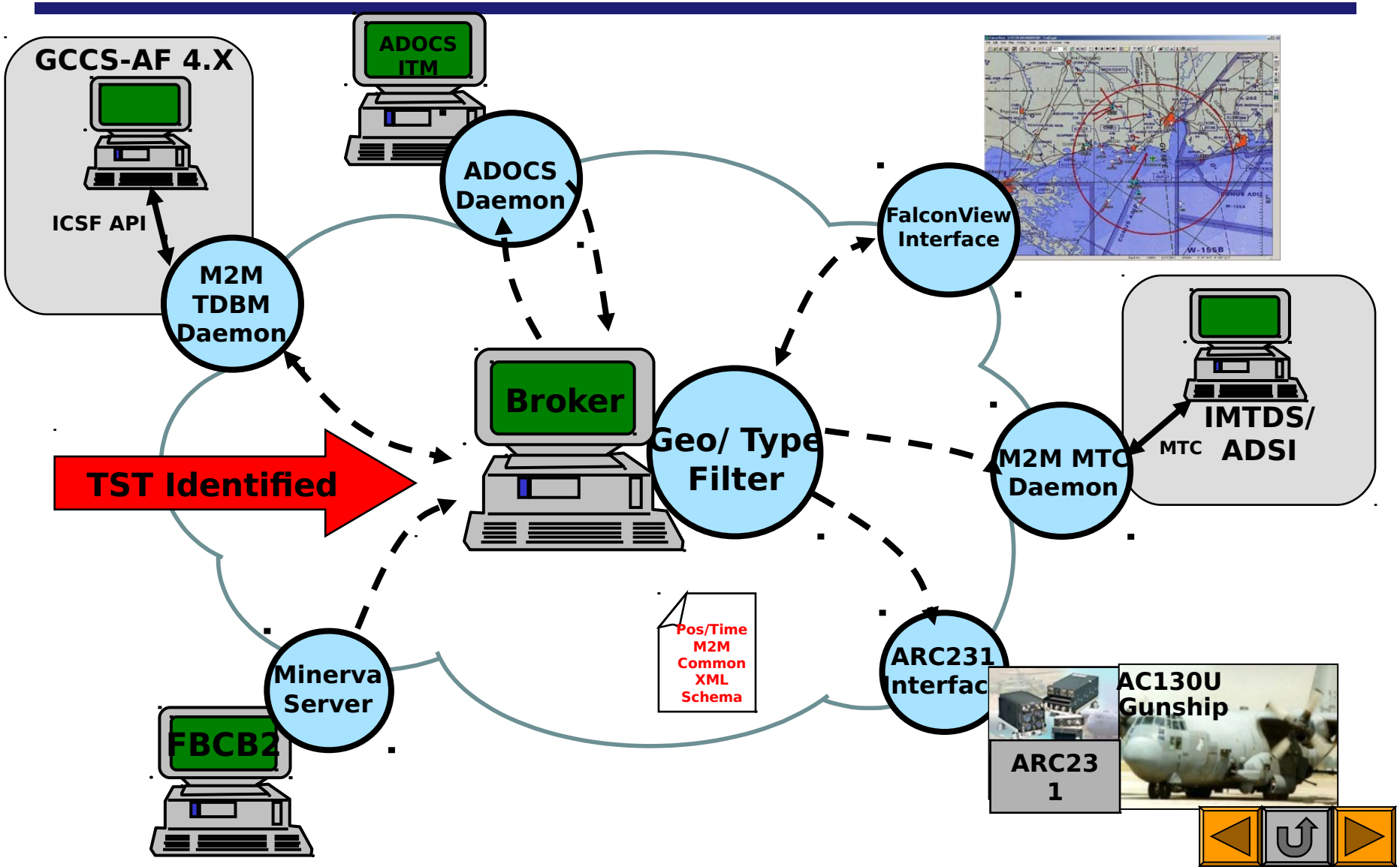
JBFSA Overall View
(Through FY03)



C2 Constellation Evaluation Criteria FY03

Requirements/ CONOPS/ Vision

FY03 Execution
- Initiatives
- Financials

Planning/ Programming
- 05APOM
- 06POM
- Domain Integration

Enablers
- C2 Constellation Architecture
- Capabilities Planning
- Experimentation
- Infrastructure
- Enterprise Governance, Engineering & KM

- **Aligned With XI Top 5 Priorities**
- **Air Force CONOPS: GSTF, Space and C4ISR**
- **Threads: TCT, CID, PBA**
- **C2 Constellation Architecture and C2ERA Compliant**
- **Open solution that replaces multiple redundant legacy components**
- **Delivers measurable C4ISR capabilities spanning multiple nodes including Joint/Coalition**
- **Provides network centric functionality; improves network centric BMC2 collaboration**
- **Executable**
  - **Mature Technology**
  - **Spiral Development With Transition Plan**
  - **Demonstrated Near Term (timeframe 6-18m)**

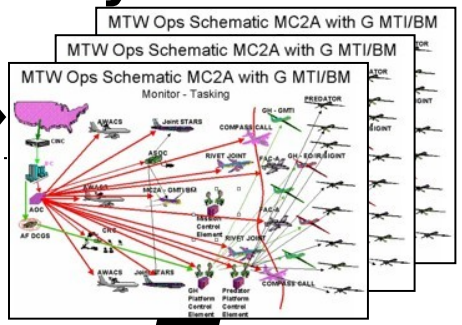
Capability-Focused Planning and Assessment Process

Air Force CONOPS

- Air & Space Expeditionary CONOPS
- Global Strike
- Homeland Security
- Global Mobility
- Nuclear Response
- Global Response
- Air & Space/C4ISR

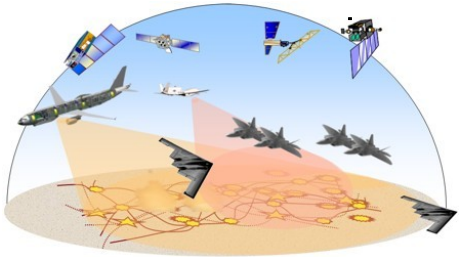
C2 Constellation CONOPS

Architecture: Ops / System / Technica

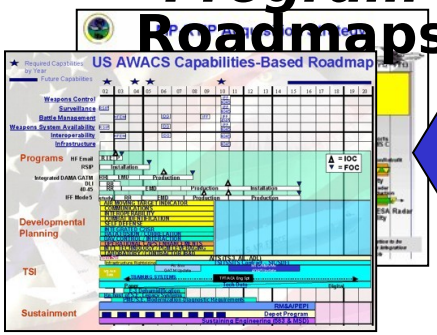

MTW Ops Schematic MC2A with G MTI/BM
MTW Ops Schematic MC2A with G MTI/BM
MTW Ops Schematic MC2A with G MTI/BM
Monitor - Tasking

CONOPS and Architecture Assessments Supported by Distributed Networked Faciliti and Advanced Simulation Environments

Integrated Capabilities

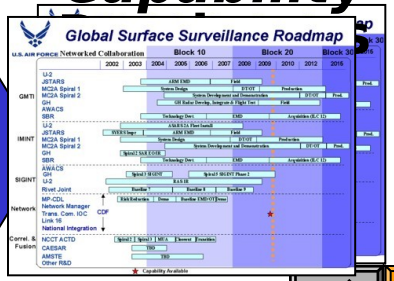


Program Roadmaps



Integrated Investment Roadmaps

Capability



Notional C2C Integrated Capability Spirals

"Tied to AEF Cycles"

Nodes/ Capabilities		AEF 1/2 Apr 04	AEF 1/2 Oct 05	AEF 1/2 Jan 06
JSTARS	SATCOM ABCCC	Block 10.2	Block 10.3	Block 10.4
AWACS	RSIP HF Email	Block 10.2	Block 10.3	Block 10.4
DCGS	DCGS 10.2/ISR-M			
Rivet Joint	NCCT Functionality			
Global Hawk	SIGINT	Block 10.2	Block 10.3	Block 10.4
AOC	MAAP, IWS/DCT, Web Enabling	Block 10.2	Block 10.3	Block 10.4
Paul Revere				
SPACE	RSOC, DSP, FIA, SBIRs	Block 10.2	Block 10.3	Block 10.4
CII		Block 10.2	Block 10.3	Block 10.4
JTRS	Limited Integration			
TDL	JDN Block 1 (SIAP)			
MILSATCOM		Block 10.2	Block 10.3	Block 10.4

AEF Cycles

1/2 3/4 5/6 7/8 9/10 | 1/2 3/4 5/6 7/8 9/10 | 1/2 3/4 5/6 7/8 9/10 | 1/2 3/4 5/6 7/8

DMO EXERCISE / TRAINING EVENTS

Integration Events

- JEFX 02
- JWID 03
- ROVING SANDS 03
- JEFX 04
- JCIET 04

JDEP INTEGRATION EVENTS

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JEFX Success Stories

- CAOC as a Weapon System
- Time Critical Targeting
- Distributed Collaborative Ops
- Integrated Space Into CAOC
- Info Management
- ISR Battle Management
- Integrated Logistics
- Reduced ATO Cycle

… and more!

- Multi-Level Secure Info Transfer
- Network Management
- Info Assurance
- Data Links

… and more!

- TBMCS / SBMCS Applications
- Integrated Defensive Avionics
- System / Multi-mission Advanced Tactical Terminal
- Broadsword / C2 Link
- AWACS Broadcast Intel
- Rapid Precision Targeting System
- Collaborative Tools
- ACS Integrated Logistics C2
- Target Prioritization Tool

… and more!

- Joint Targeting Workstation Tactical Fusion Prototype
- B-2 Command & Control for Rapid Halt
- Global Air Mobility Operational Display (GAMOD)
- C2 Info Planning System (C2IPS)
- Dynamic Info Gateway Mgt System (DIGMAS)
- Info For Global Reach
- Theater Weather Server

27 of 70 current CAOC systems transitioned JEFX initiatives
5 of 7 JEFX 02 initiatives fielded for OIF

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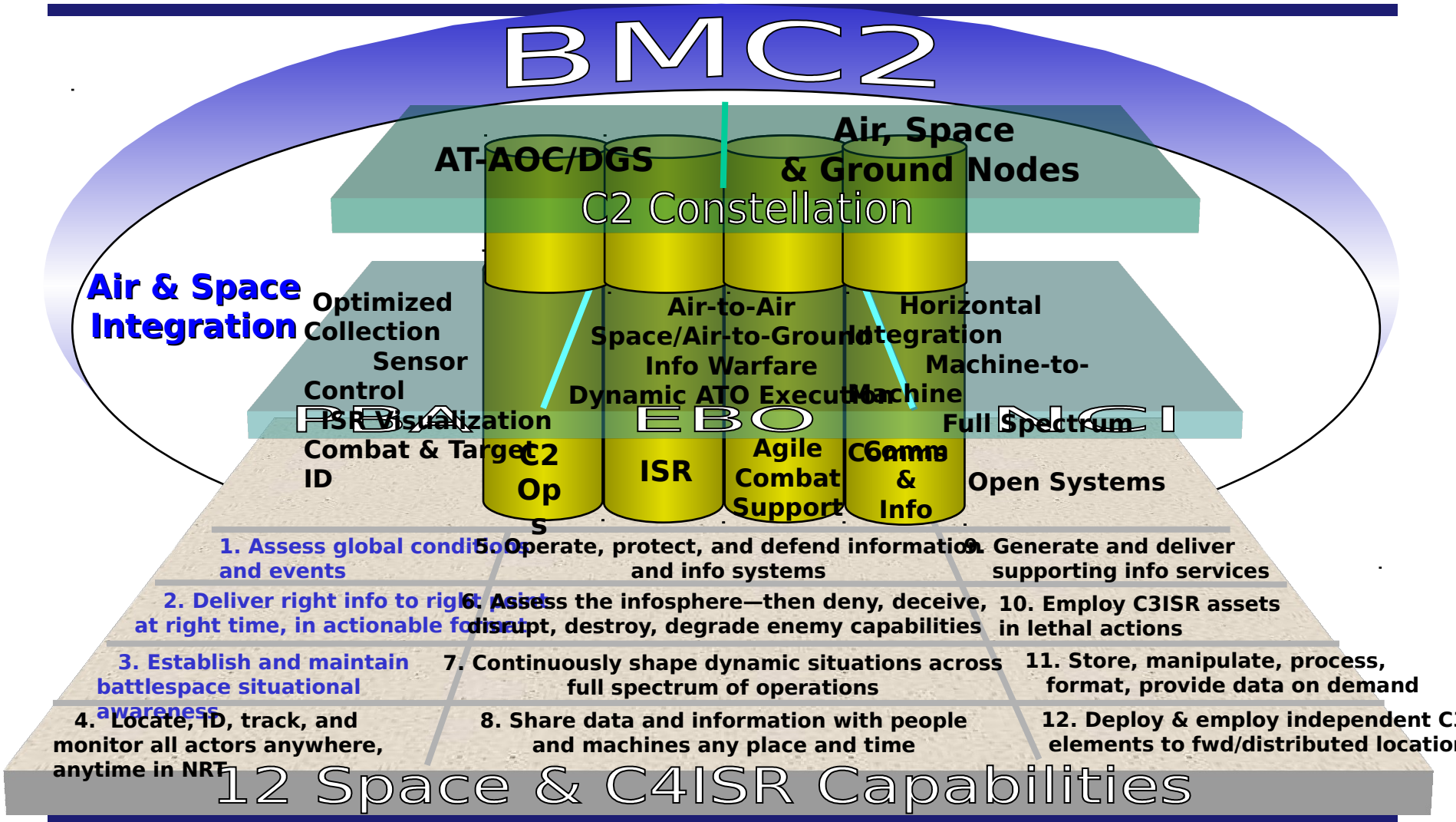
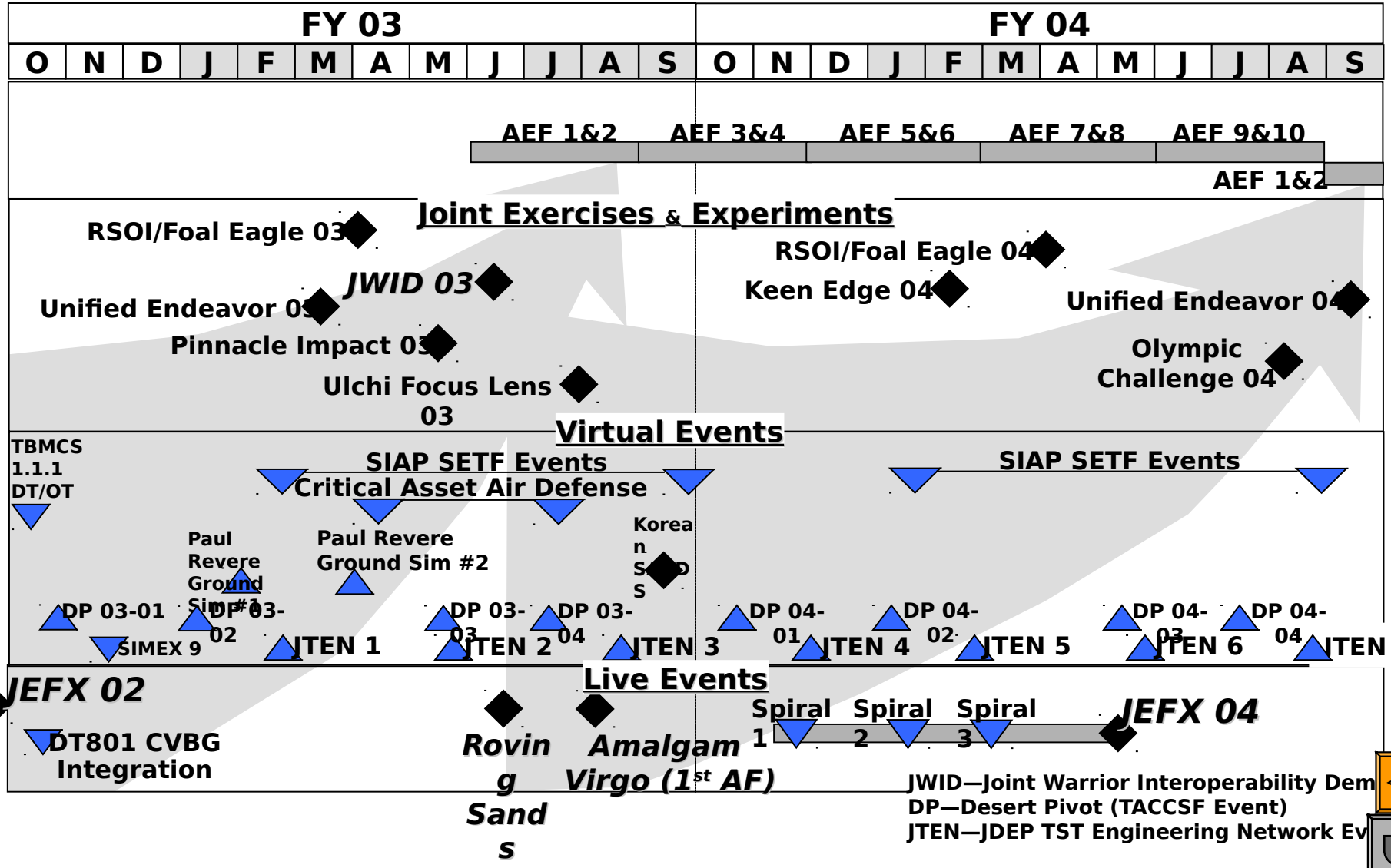
JEFX 04


BMC2
Air, Space & Ground Nodes
AT-AOC/DGS
C2 Constellation
Air & Space Integration
Optimized Collection
Sensor Control
ISR Visualization
Combat & Target ID
Air-to-Air
Space/Air-to-Ground
Info Warfare
Dynamic ATO Execution
Horizontal Integration
Machine-to-Machine
Full Spectrum
Open Systems
FBA
EBO
NCI
C2 Ops
ISR
Agile Combat Support
Comms & Info
1. Assess global conditions and events
5. Operate, protect, and defend information and info systems
9. Generate and deliver supporting info services
2. Deliver right info to right point at right time, in actionable format
6. Assess the infosphere—then deny, deceive, disrupt, destroy, degrade enemy capabilities
10. Employ C3ISR assets in lethal actions
3. Establish and maintain battlespace situational awareness
7. Continuously shape dynamic situations across full spectrum of operations
11. Store, manipulate, process, format, provide data on demand
4. Locate, ID, track, and monitor all actors anywhere, anytime in NRT
8. Share data and information with people and machines any place and time
12. Deploy & employ independent C3 elements to fwd/distributed location
12 Space & C4ISR Capabilities

Integration, Experimentation & Fielding

Tied to Air & Space Expeditionary Force CONOPS



Network-Centric Warfare: The Call for Change

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National Defense Authorization Act
for Fiscal Year 2001, 106-292
Network Centric Warfare Sec. 906
"NCW is about networking capabilities, rather than creating separate networks or technologies, and is a means to generate greater combat power, dominance and synergy through a linking of critical information sources

House Appropriations Committee,
106-644, June 1, 2000
"Without a networked approach, it remains unclear to the committee if the intelligence currently gathered from these platforms can be properly and timely exploited and disseminated to the tactical commander, which calls into question the wisdom of simply buying more of the same "un-networked" assets."
"Therefore, the committee directs that

James G. Roche, Secretary of the Air Force
"We will network these systems in ways that enable us to find, fix, track, target, engage and assess in timelines unimaginable just a few years ago. It is our goal to have consistent, persistent intelligence,

Gen John Jumper, CSAF, *"Solving Problems for the Future"* "We are going to figure this out. We are going to figure out how to have conversations between airborne platforms, unmanned, on the ground, in the air. Build us a constellation that marries up the manned and the unmanned, perhaps control the unmanned platforms from the manned platforms to put them in the right position so you can triangulate for precise target location, precise identification. Create that network in the sky that will pass the information around."

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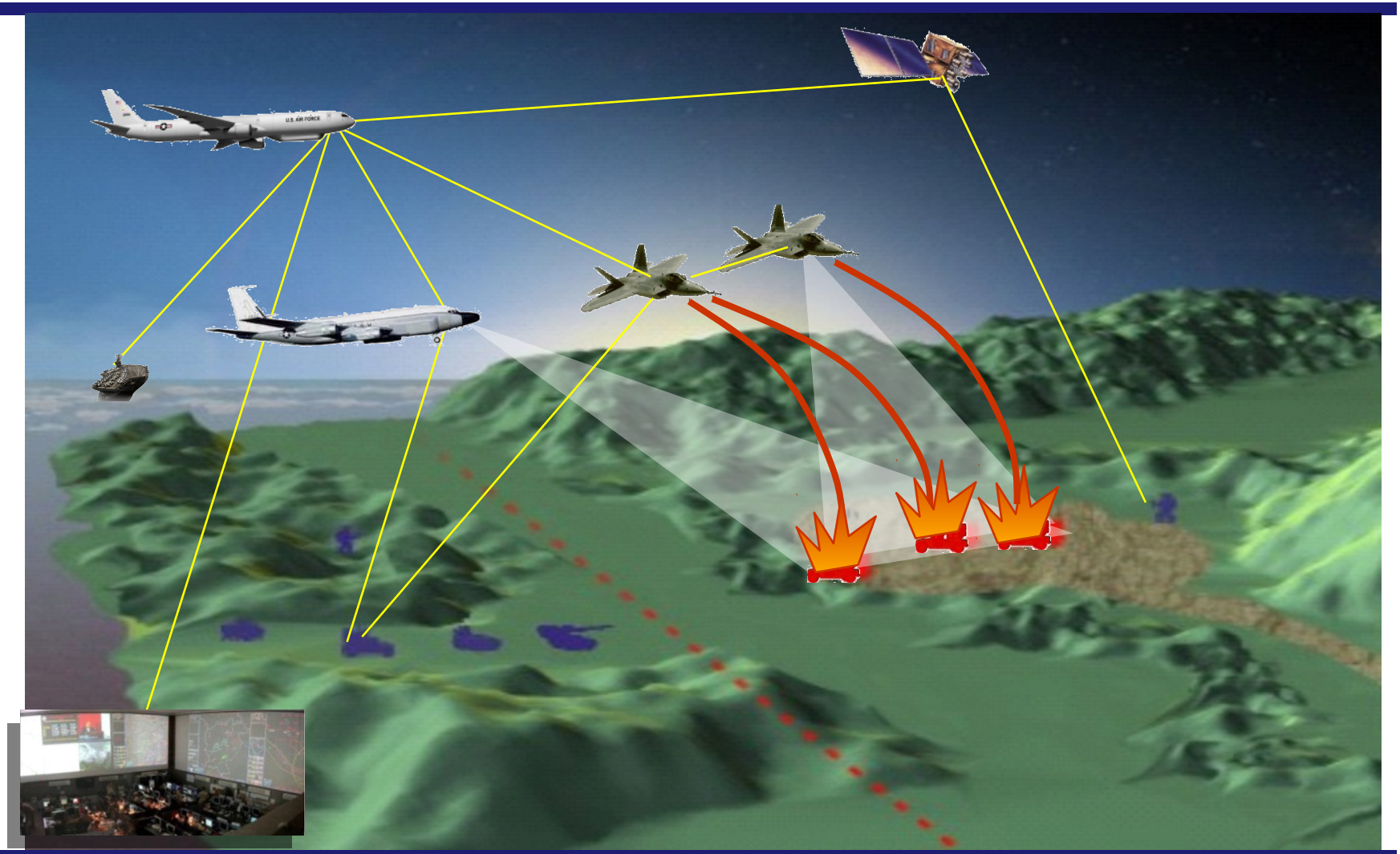
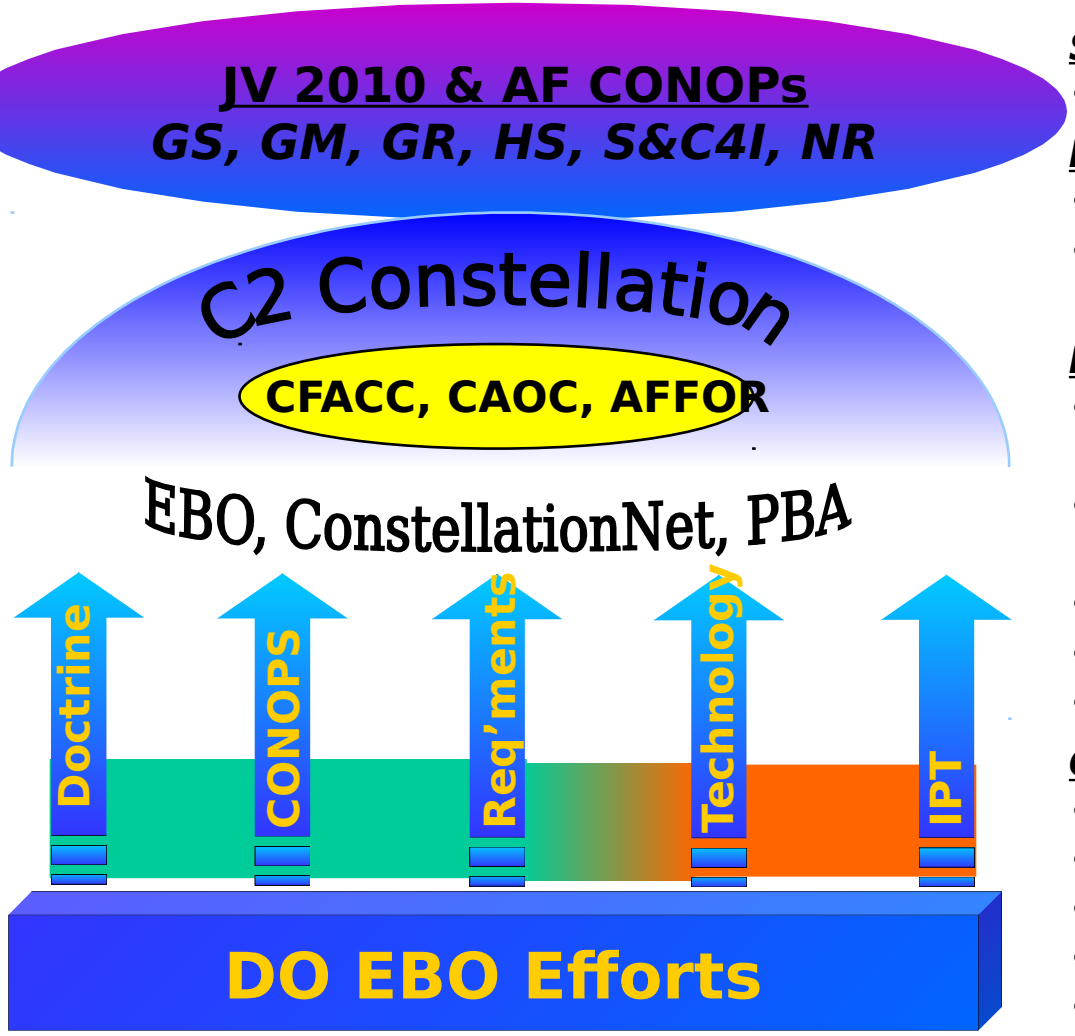
… Enhancing Effects Based Warfighter Operations



Supporting the Warfighter – Effects Based Ops



Supporting Doctrine Development

- Support ACC EBO doctrine team

Building CONOPS

- Lead for JEFX 04 EBO CONOPS
- Groundwork for later EBO CONOPS

Refining Requirements

- Support EBO requirements development
- AOC Requirements Working Group (AO)
- C2 Ops SDIPT (AO)
- AOC IPT (O-6)
- C2 GOSG (2-3 star)

CFACC 2010 Capabilities

- PBA/EBO Initiative for JEFX 04
- Strategy Development Tool (SDT)
- Strategy Planning Tool (SPT)
- Causal Analysis Tool (CAT)
- EBO Wargaming Simulation (EBOWS)
- Information Warfare Planni

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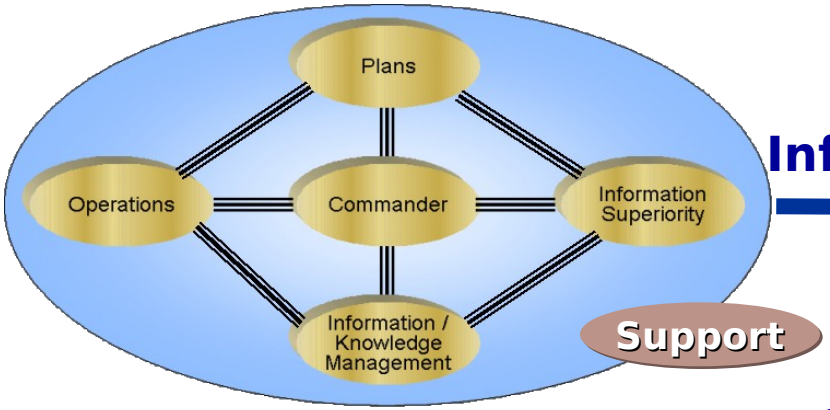
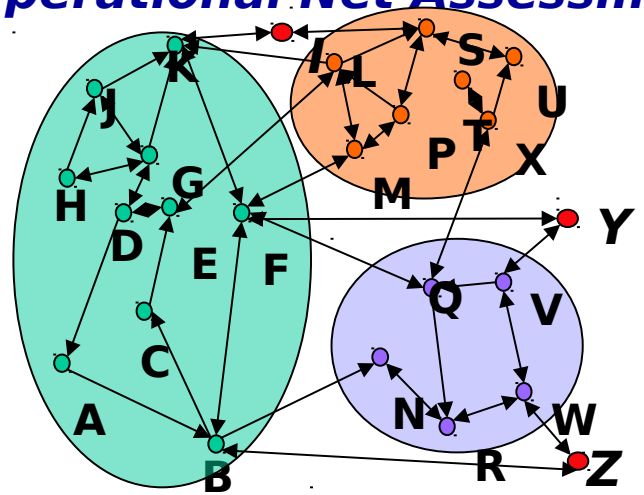
EBO Enables RDO
The Joint Hypothesis

If…A Standing Joint Force Headquarters



Informed by:

Operational Net Assessment



Employing

Effects-Based Operations

A process for obtaining a desired "effect" on the enemy that leads to achieving an objective

Then…

Rapid Decisive Operations

Supporting the Warfighter – MC2A / E-10A

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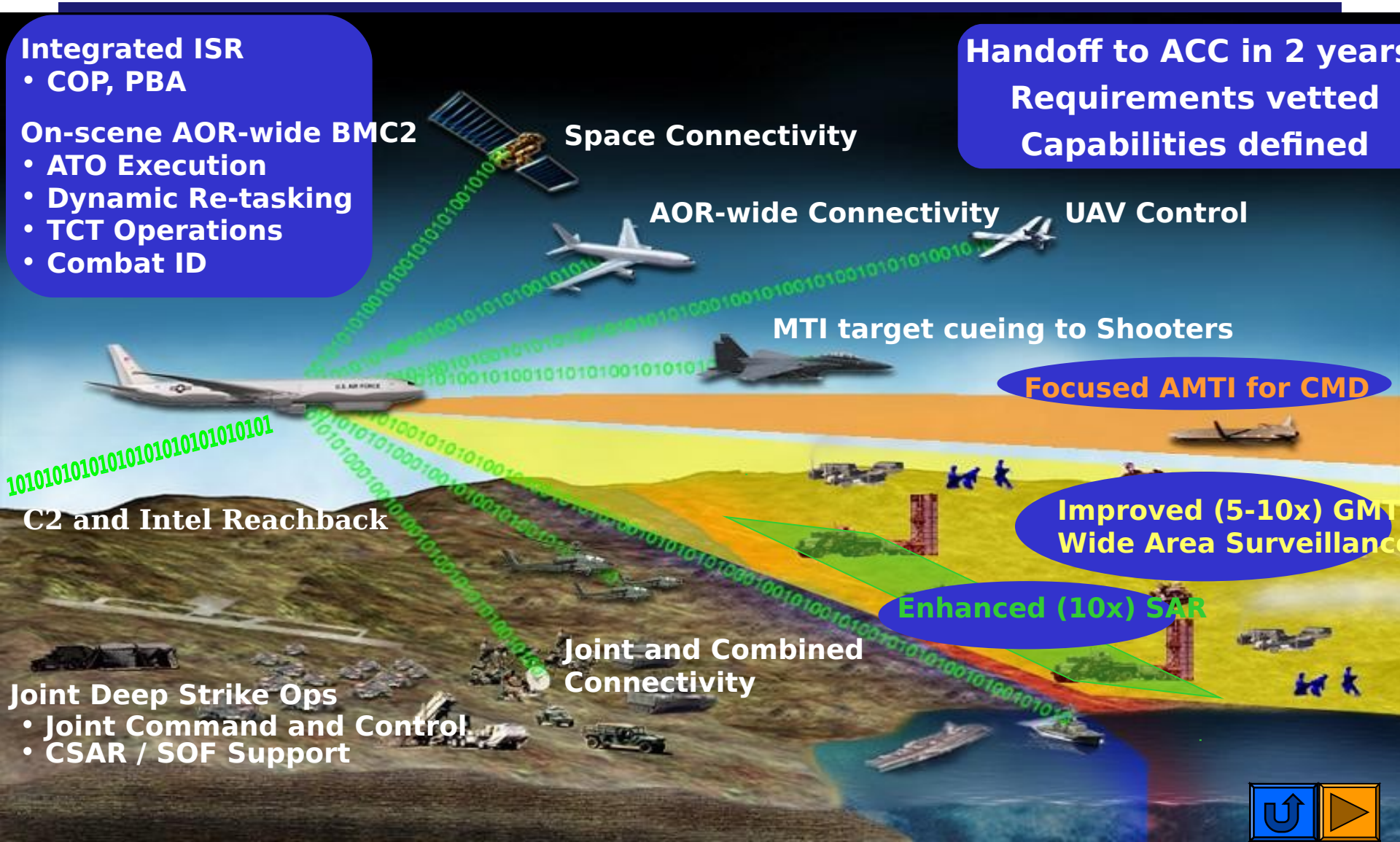

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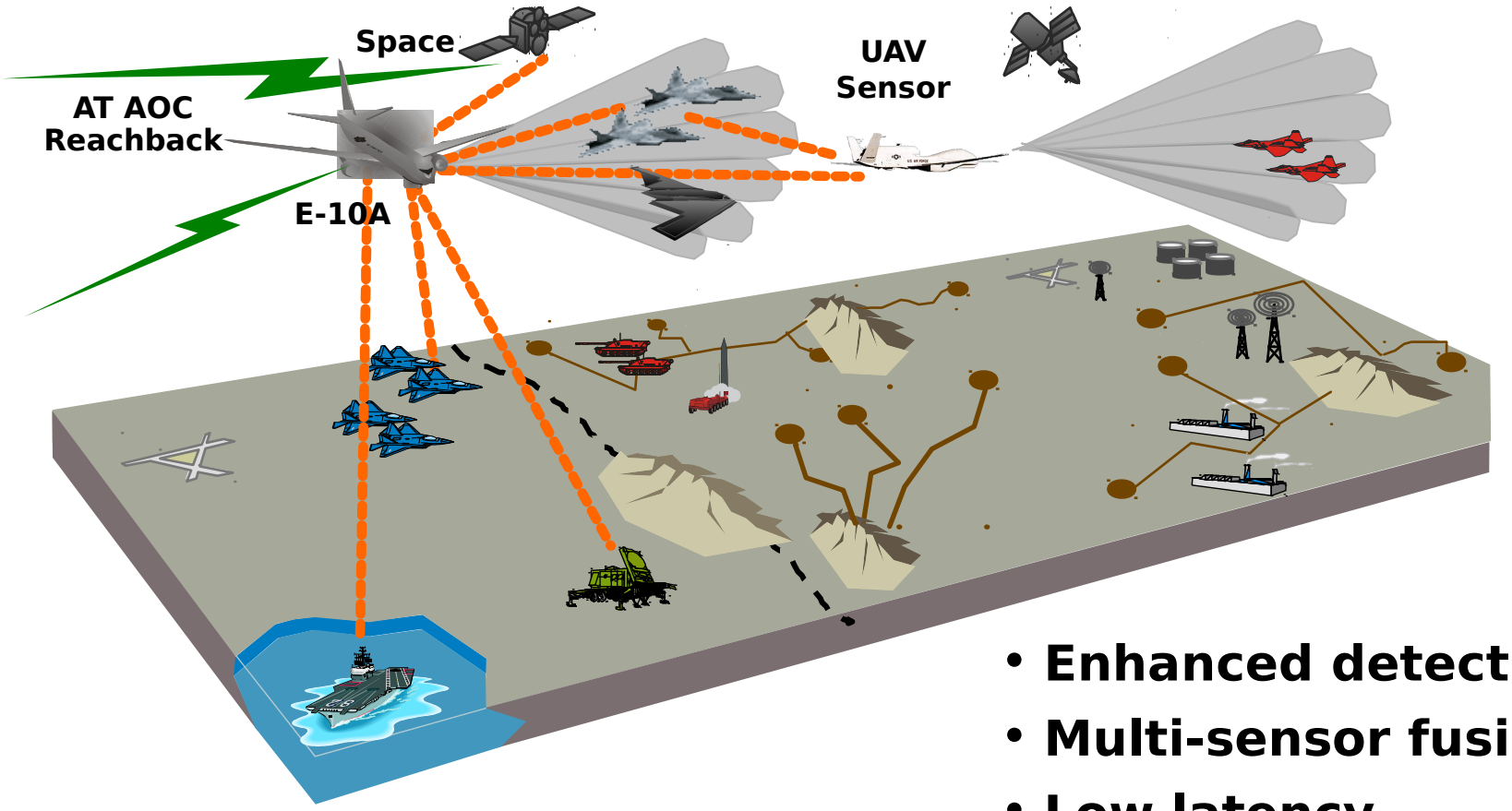
Airborne Early Warning Capabilities



- Enhanced detection
- Multi-sensor fusion
- Low latency distribution
- Exploit, deny, disrupt

E-10A Sensor Capabilities

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BMC2 Enhancements:

State-of-the-Art Sensors / Processors

Low Latency - Long Range Coverage

Fire Control Quality Data

Enhanced Target Resolution

AEW – Potential For Several Sensor Configurations –Spiral 2

Standard S-Band Dome

Non-Rotating Dome - UHF Waveform (a la Navy E-2)

MP-RTIP 4 x 20 ft AESA - Canoe Mounted + BMC2 – Spiral 1
Retains space for AEW Sensor

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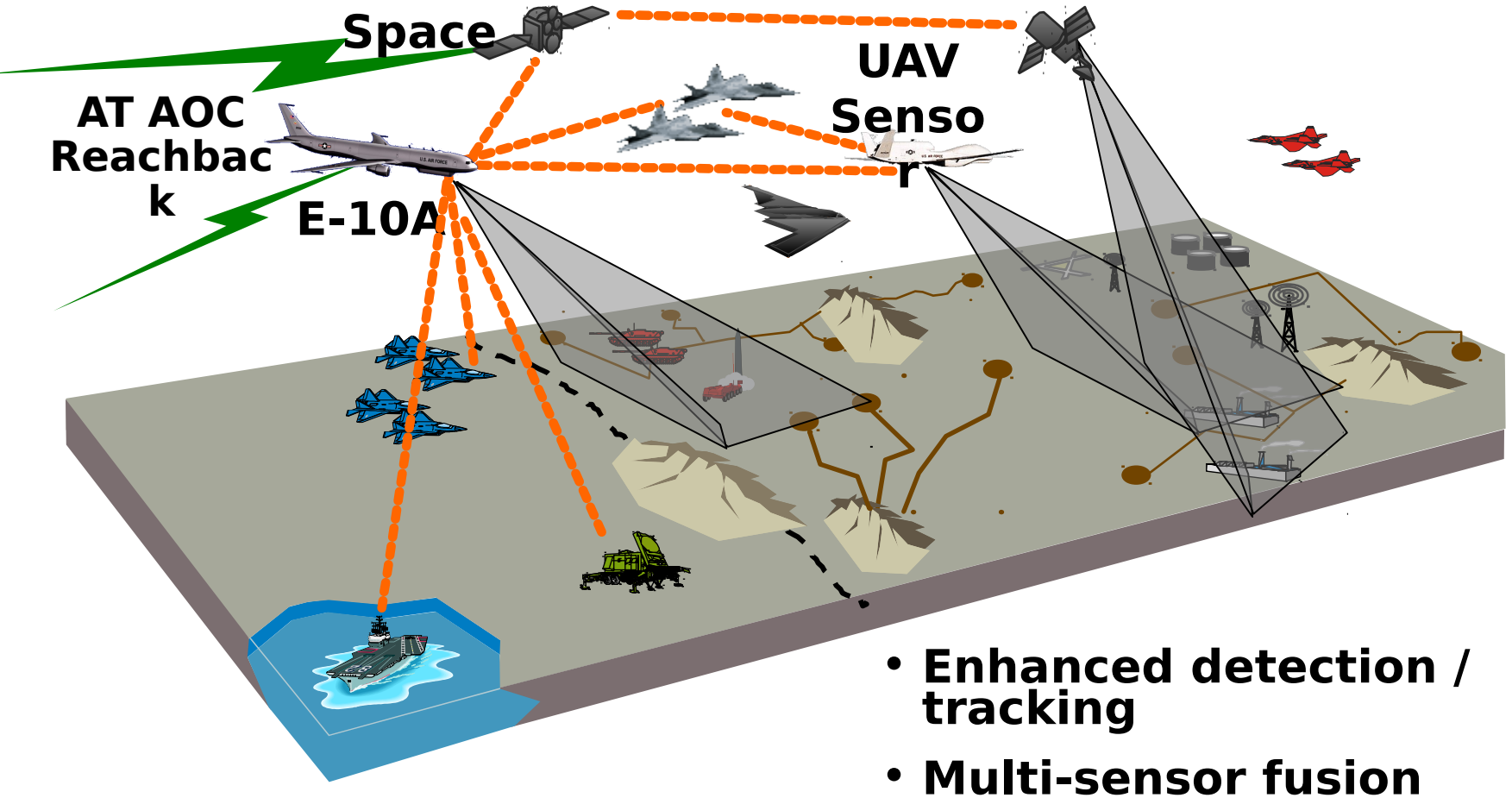
Surface Surveillance Capabilities



- Enhanced detection / tracking
- Multi-sensor fusion
- Machine-to-machine interface
- Ultra-high resolution

E-10A Sensor Capabilities

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BMC2 Enhancements:

- State-of-the-Art Sensors / Processors
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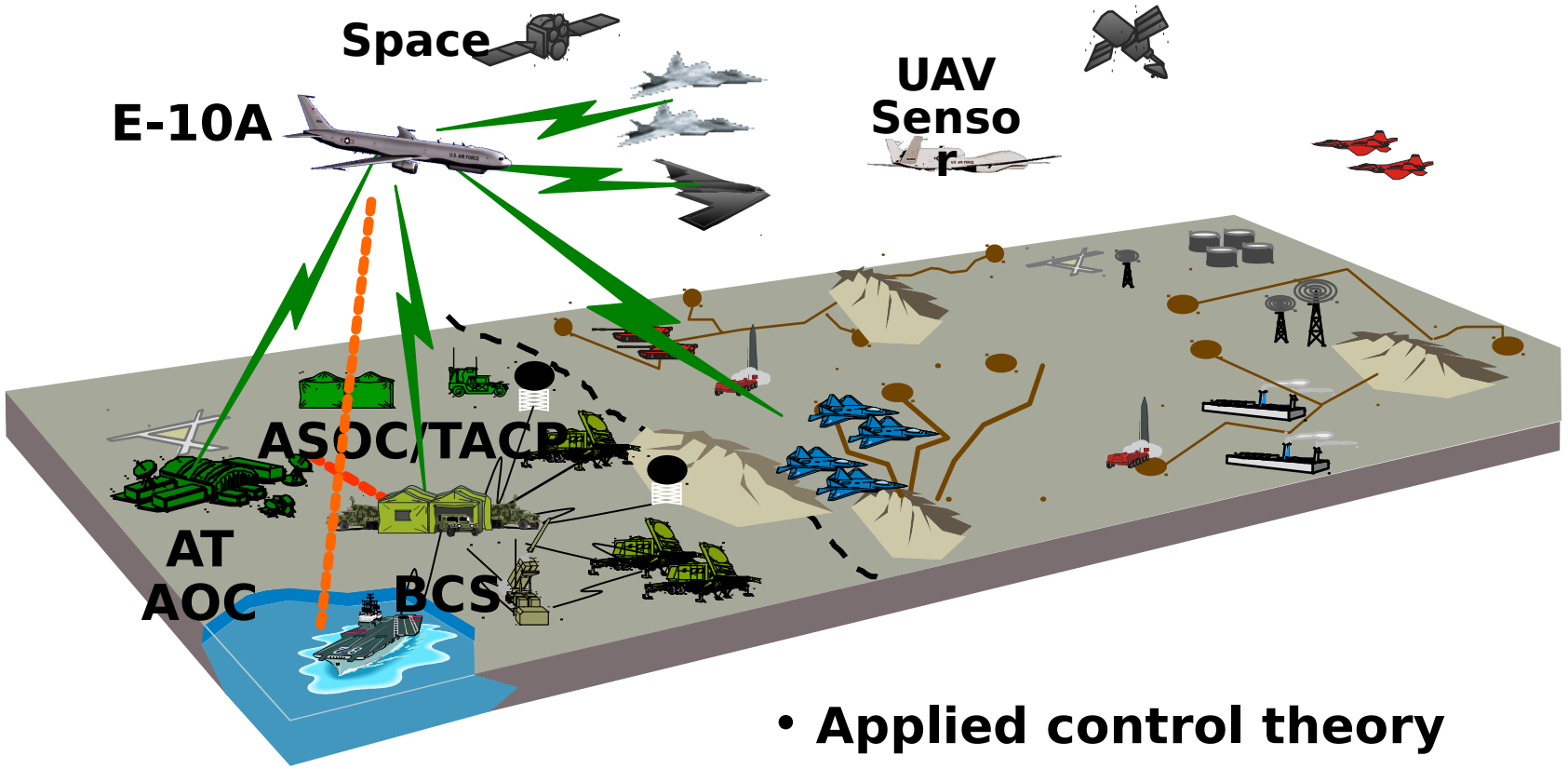
Dynamic Execution Capabilities



- Applied control theory
- Senior and tactical decision making
- Task Strikers

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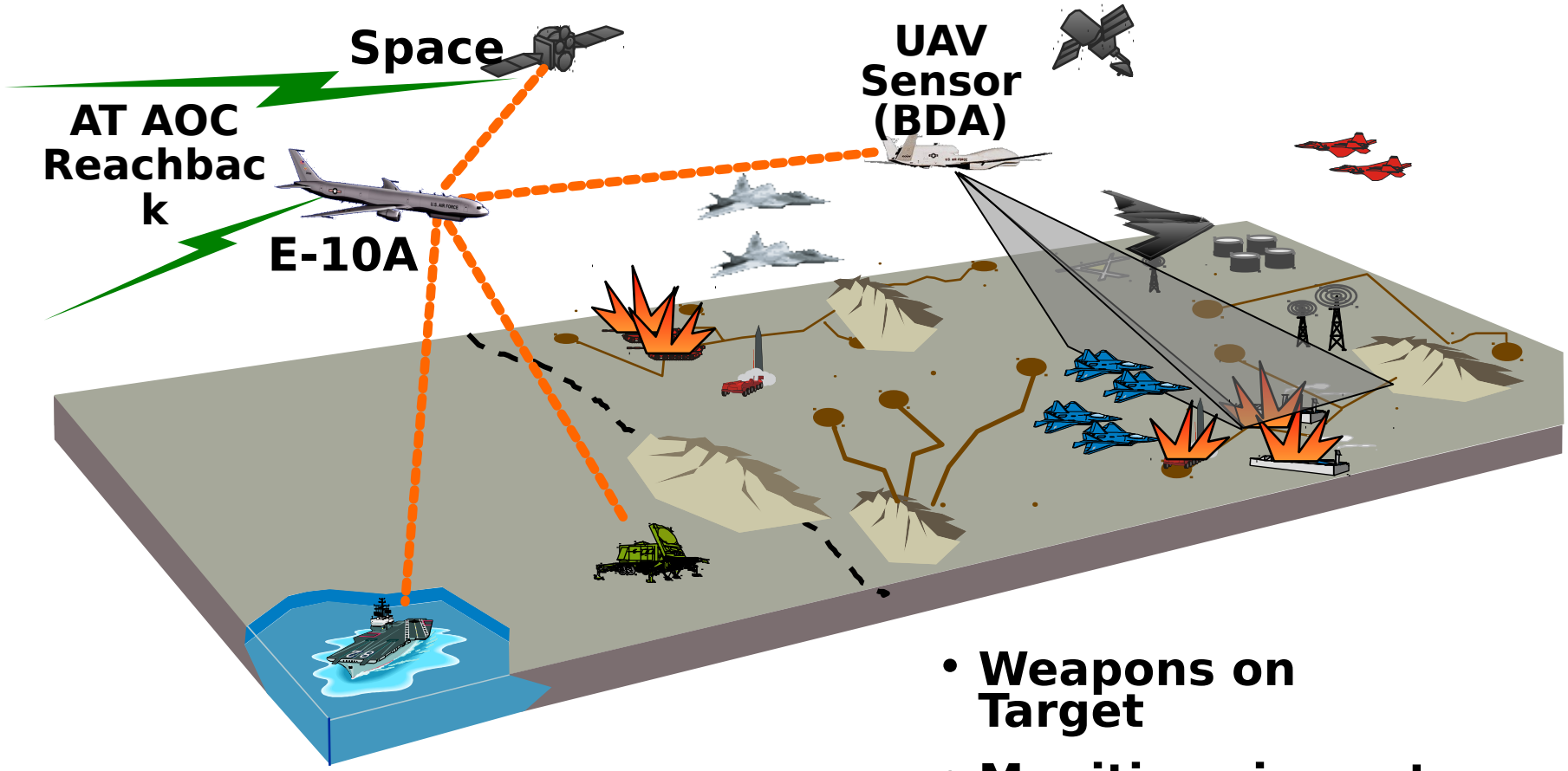
Dynamic Execution Capabilities (Cont)



- Weapons on Target
- Munitions impact
- Immediate BDA

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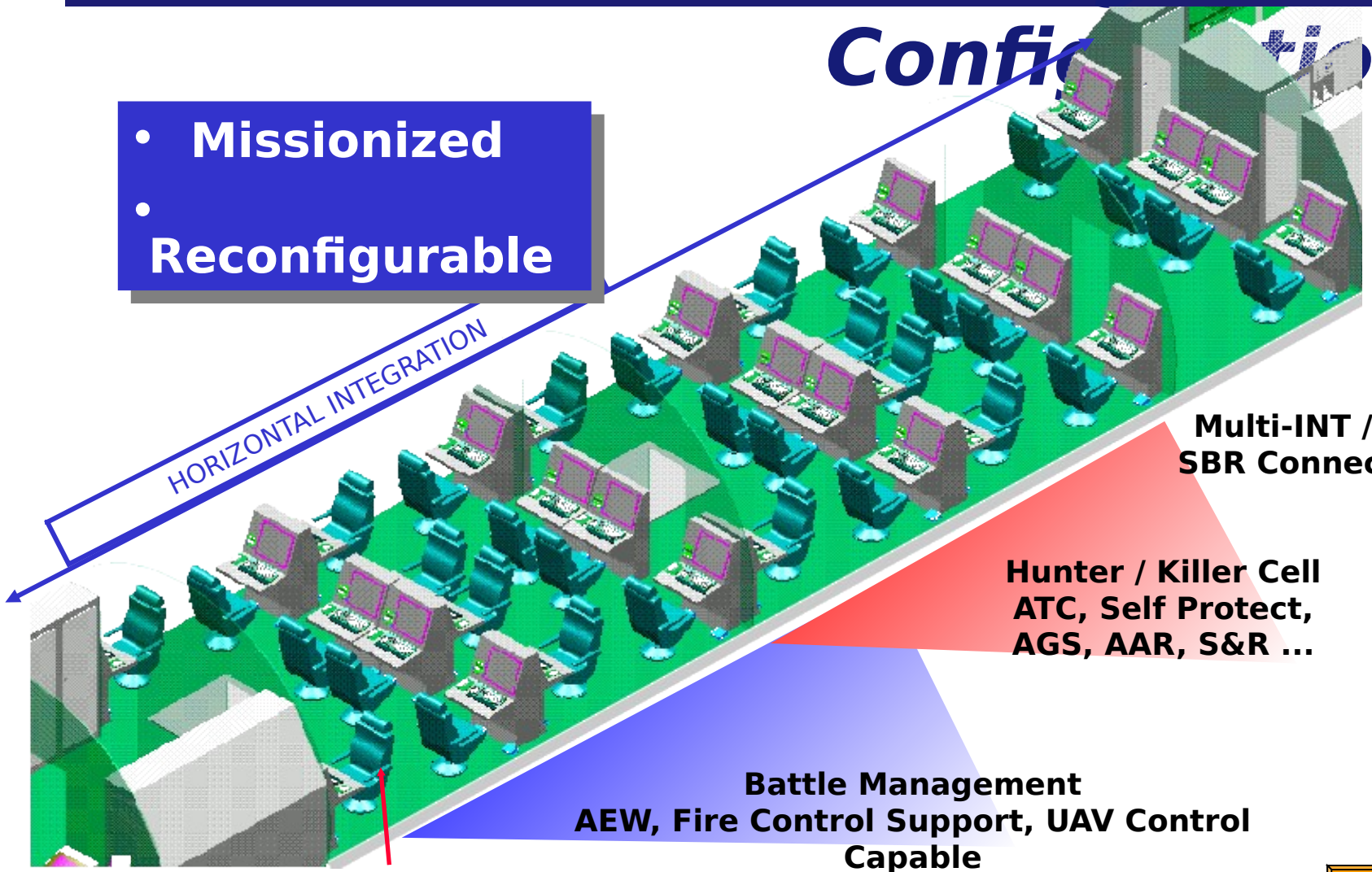
Notional Battle Management Configuration

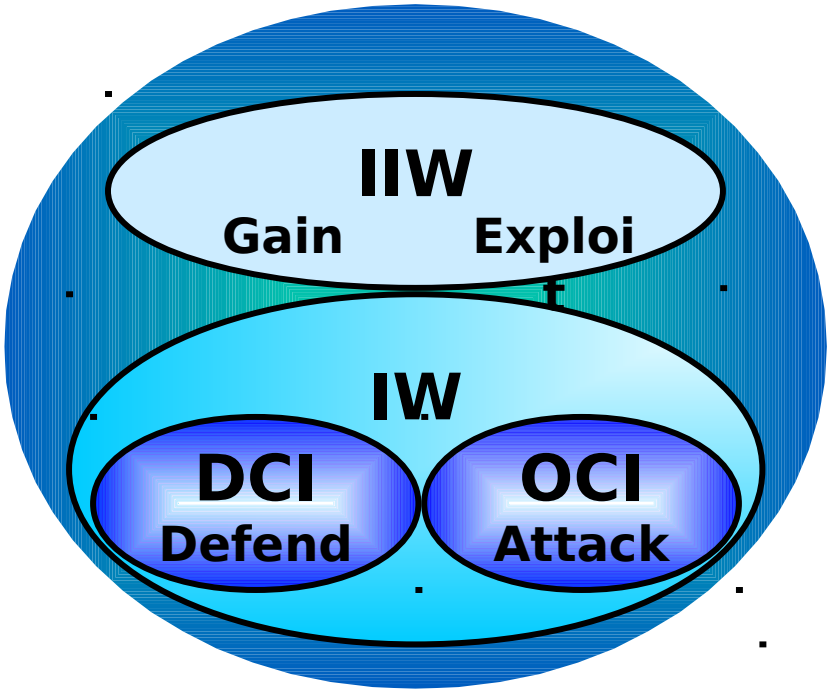
- Missionized
- Reconfigurable



Information Operations Capabilities

- **Information-in-Warfare (IIW) includes the gain and exploit aspects of IO**
- **IW includes attack and defend aspects of IO**
- **Counterinformation includes both offensive (OCI) and defensive (DCI) activities**

  - **OCI – actions taken to attack adversary information and information systems**
  - **DCI – actions taken to protect Air Force information and information systems**



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Information Warfare Capabilities

- **Information Warfare**
  - **Effects-based**
  - **All levels of warfare: Strategic, Operational & Tactical Effects**
- **Defensive Counterinformation**
  - **OPSEC**
  - **Information Assurance**
  - **Computer Network Defense**
  - **Counterdeception**
  - **Counterintelligence**
  - **Public Affairs Ops**
  - **Counterpropaganda Ops**
  - **EW (protect)**
- **Offensive Counterinformation**
  - **PSYOPs**
  - **EW**
  - **Military Deception**
  - **Physical Attach**
  - **Computer Network Attack**
  - **Public Affairs Ops**

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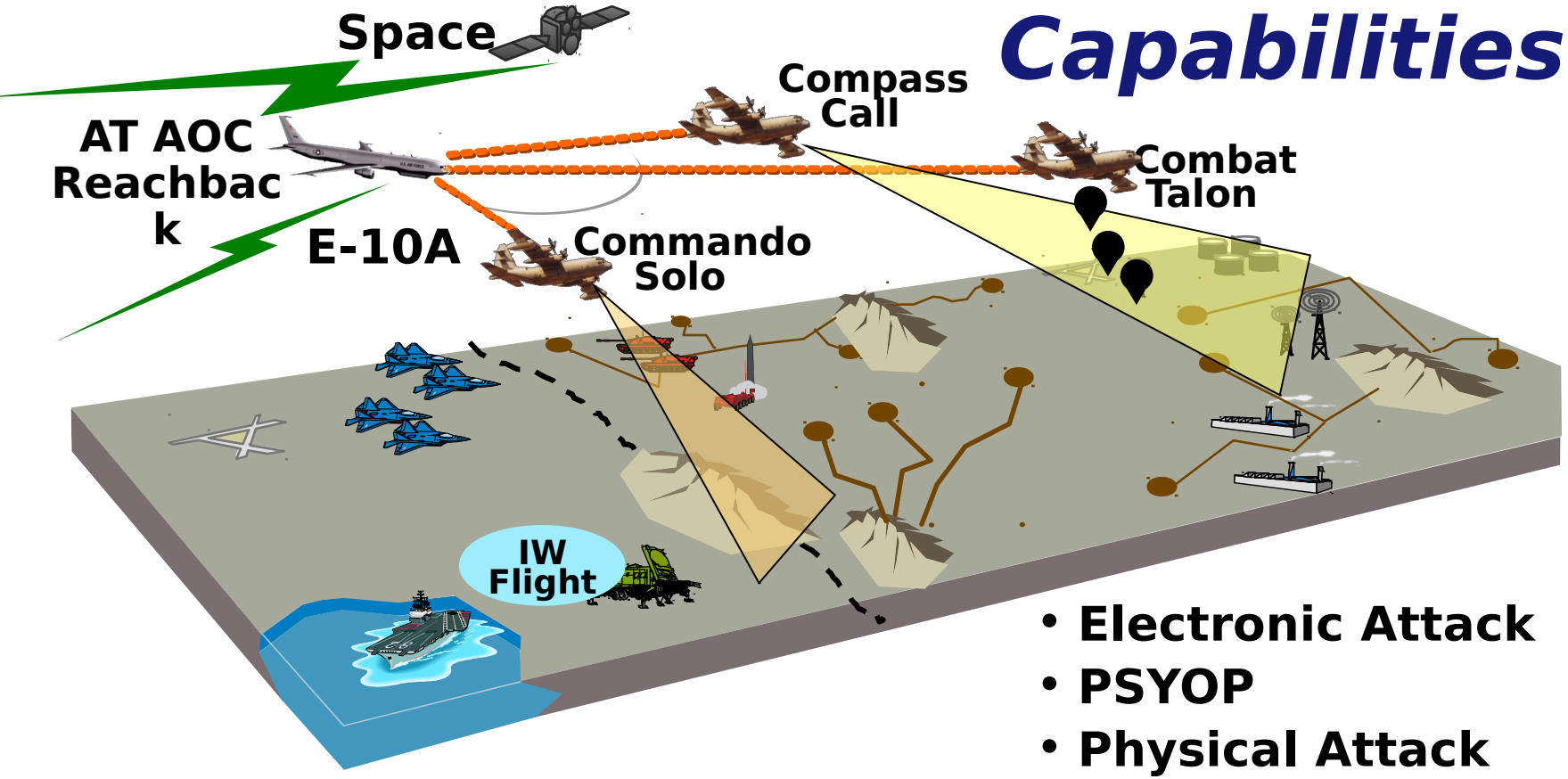
Offensive Counterinformation BMC2 Capabilities



- Electronic Attack
- PSYOP
- Physical Attack
- Public Affairs Broadcast
- Military Deception

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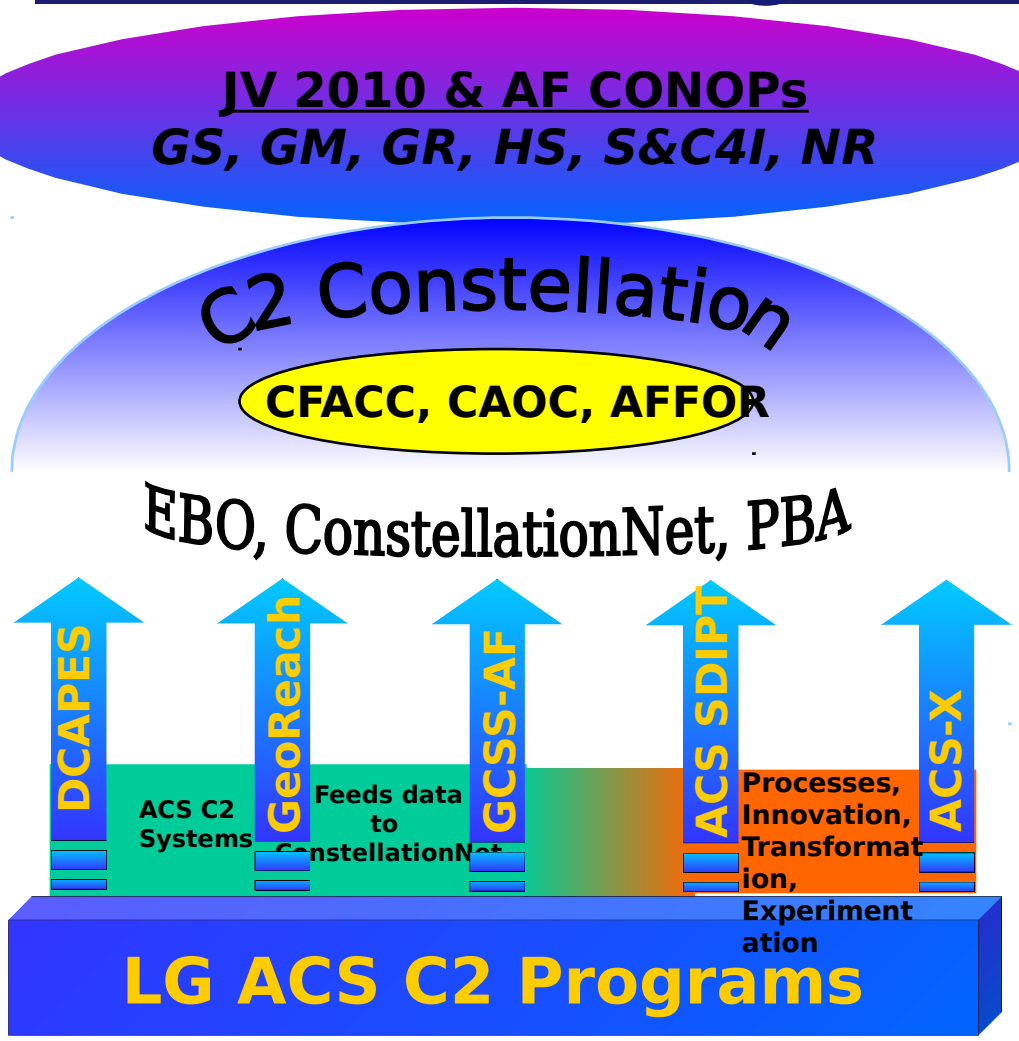
Supporting the Warfighter - Netcentric Logistics



DCAPES
- Precision personnel to theater
- Sole AF feed to JOPES
- Gets AF troops to fight, tracks them and brings them home

GeoReach
- Predictive / best case FOL planning
- Presents FOL options
- Reduces deployment footprint

GCSS-AF
- Decision quality information to warfighter
- Will be used by virtually all ACS warfighters
- Major ConstellationNet System

ACS SDIPT
- Delivers ACS C2 capability to warfighter

ACS-X
- ACS technologies to support CAOC
- Future support to additional operational and ACS C2 nodes

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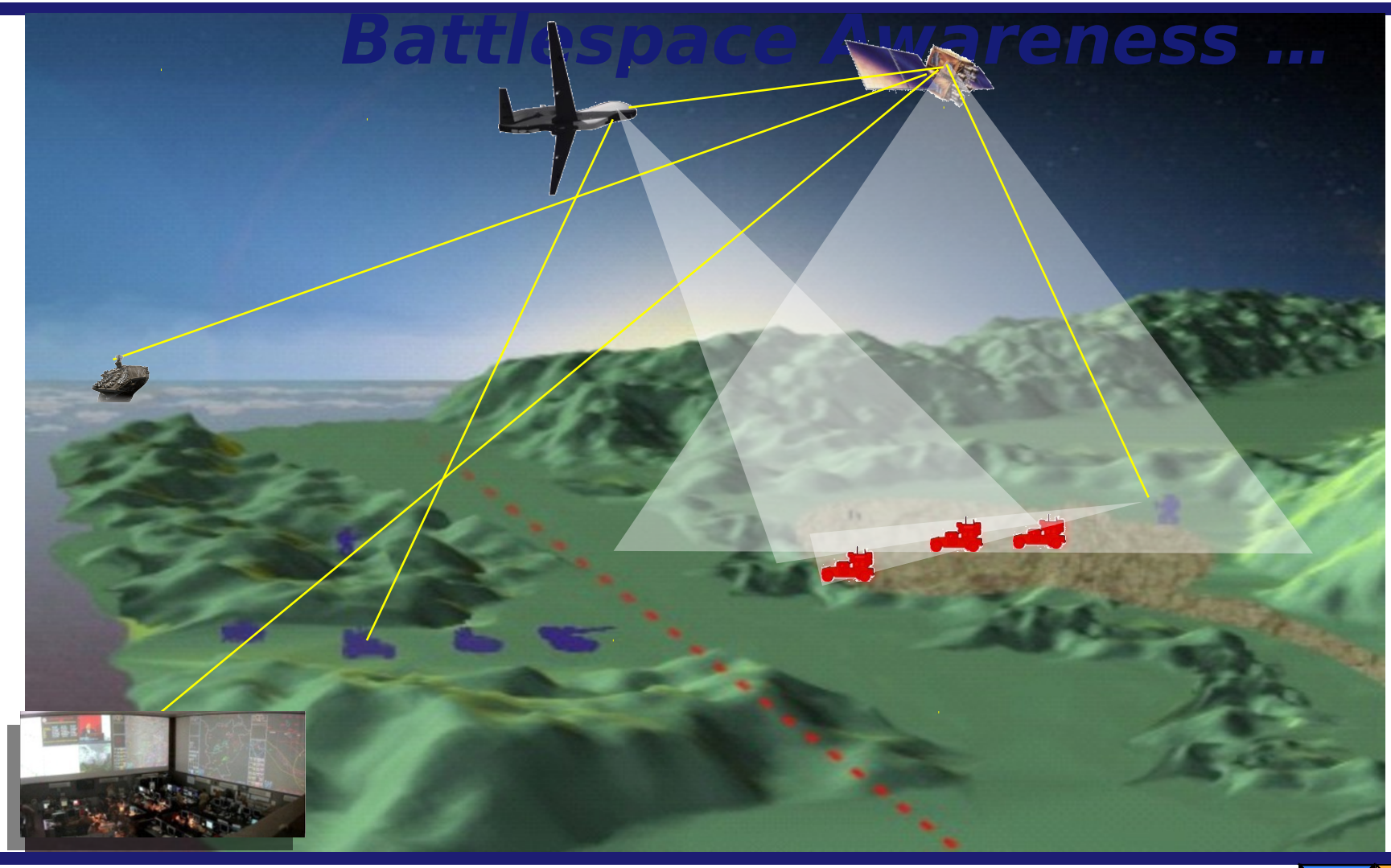
… Enable Continuous Predictive Battlespace Awareness …



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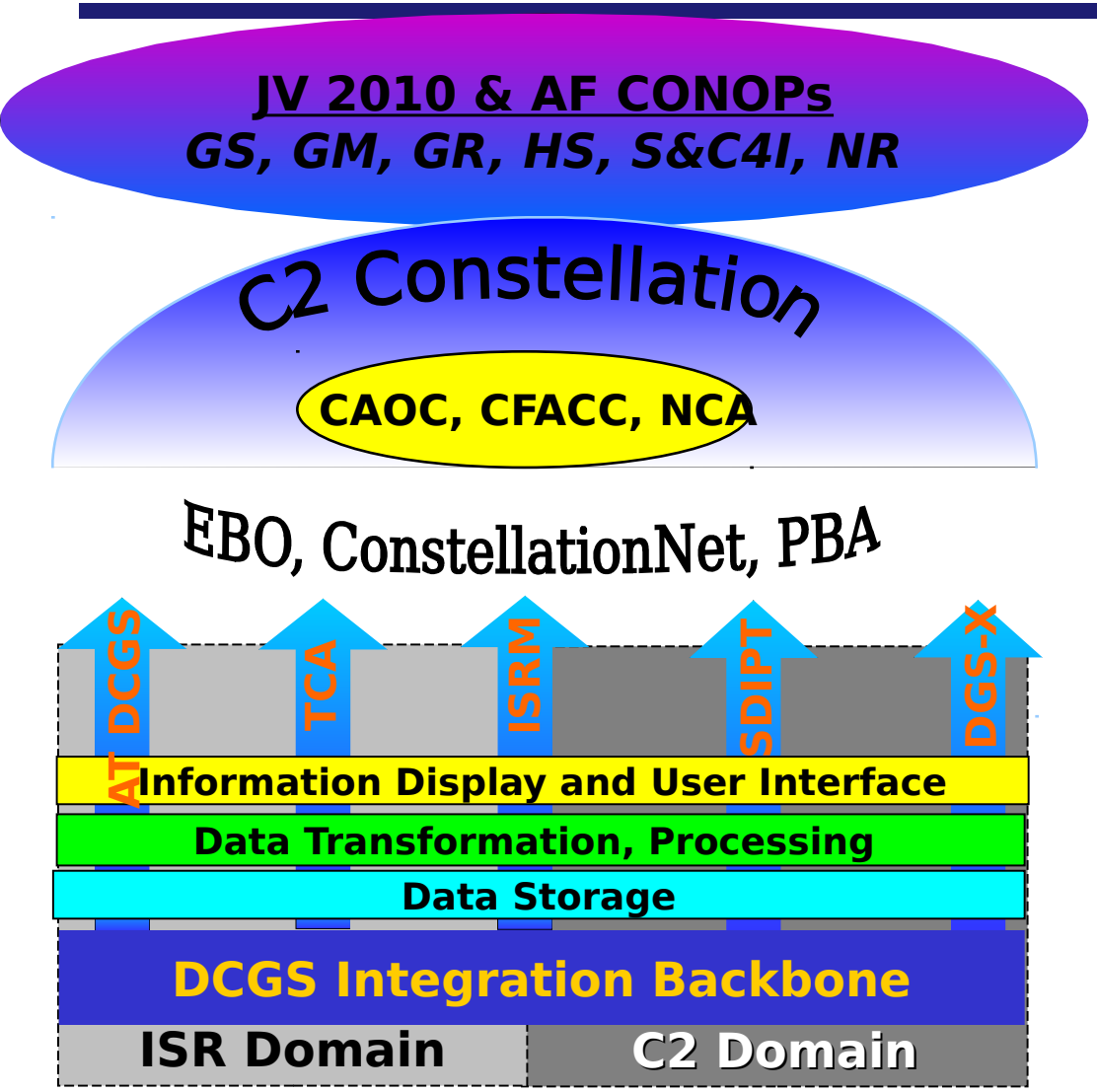
Supporting the Warfighter – PBA through DCGS



AT DCGS
- AF TPED Element for the AF
- Actionable information shared between ISR and C2 Domain

TCA
- Common comm enabling netcentric ops
- Allows distributed collaborative ops
- Reduces deployment footprint

ISRM
- ISR visualization / sensor SA in CAOC
- Sensor control more responsive to CFACC intent

ISR SDIPT
- Delivers DCGS capability to warfighter
- Manage DCGS, ISR and TPED innovation

DGS-X

PBA and the Kill Chain

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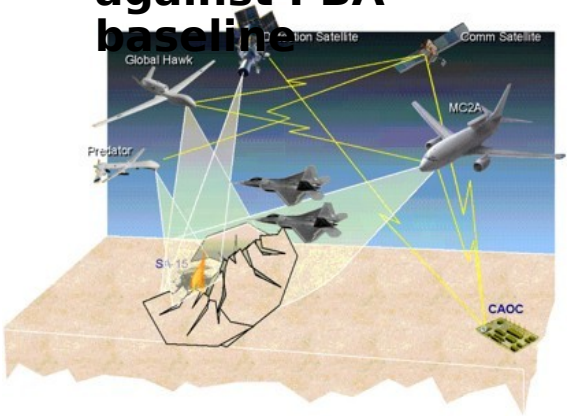
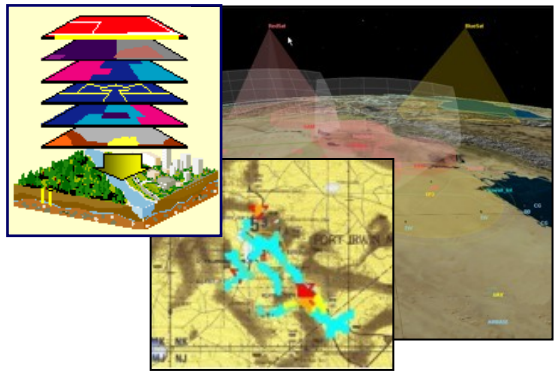
Assess

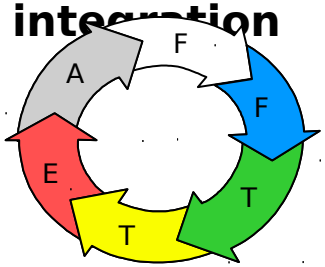
- Various assessments against PBA baseline



FIND, FIX

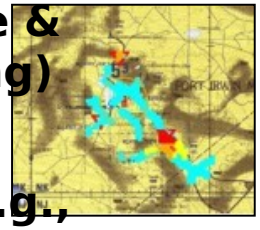
- IPB—Focus, Anticipate
- Mitigate / optimize battlespace effects
- Persistent ISR—Horizontal / Vertical integration





TRACK

- Sensor mix and sequencing ISR ops (e.g., cross-cue & dynamic tasking)
- Battlespace observation refinements (e.g., movement projections)



TARGET

- Target priorities and situation refinement
- Correlating ATO for strike packages
- Identify BDA asset

Engage

- Situation awareness and risk assessment
- Reattack / Rerole

Decision Quality Information leads to Intuitive Decision Making

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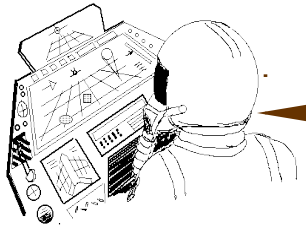
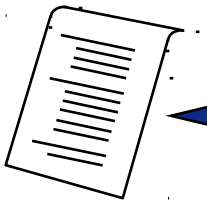


"Person-to-Person"

"Battlespace Awareness"

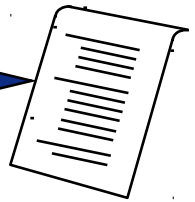
"Machine-to-Machine"

"Shared Knowledge"



Messages

"Shared Data"



Signals

"Connectivity"

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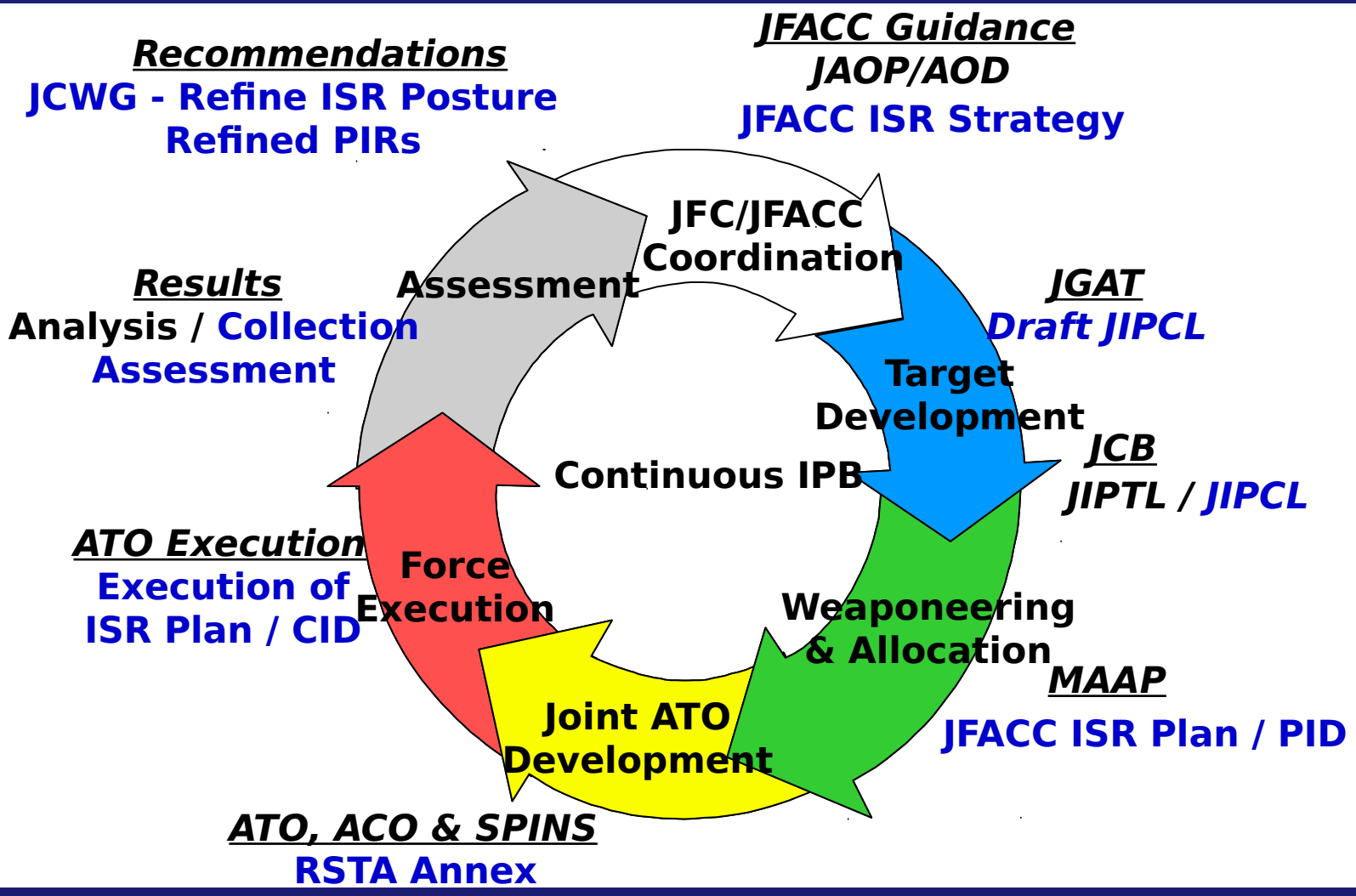
PBA in ATO Cycle



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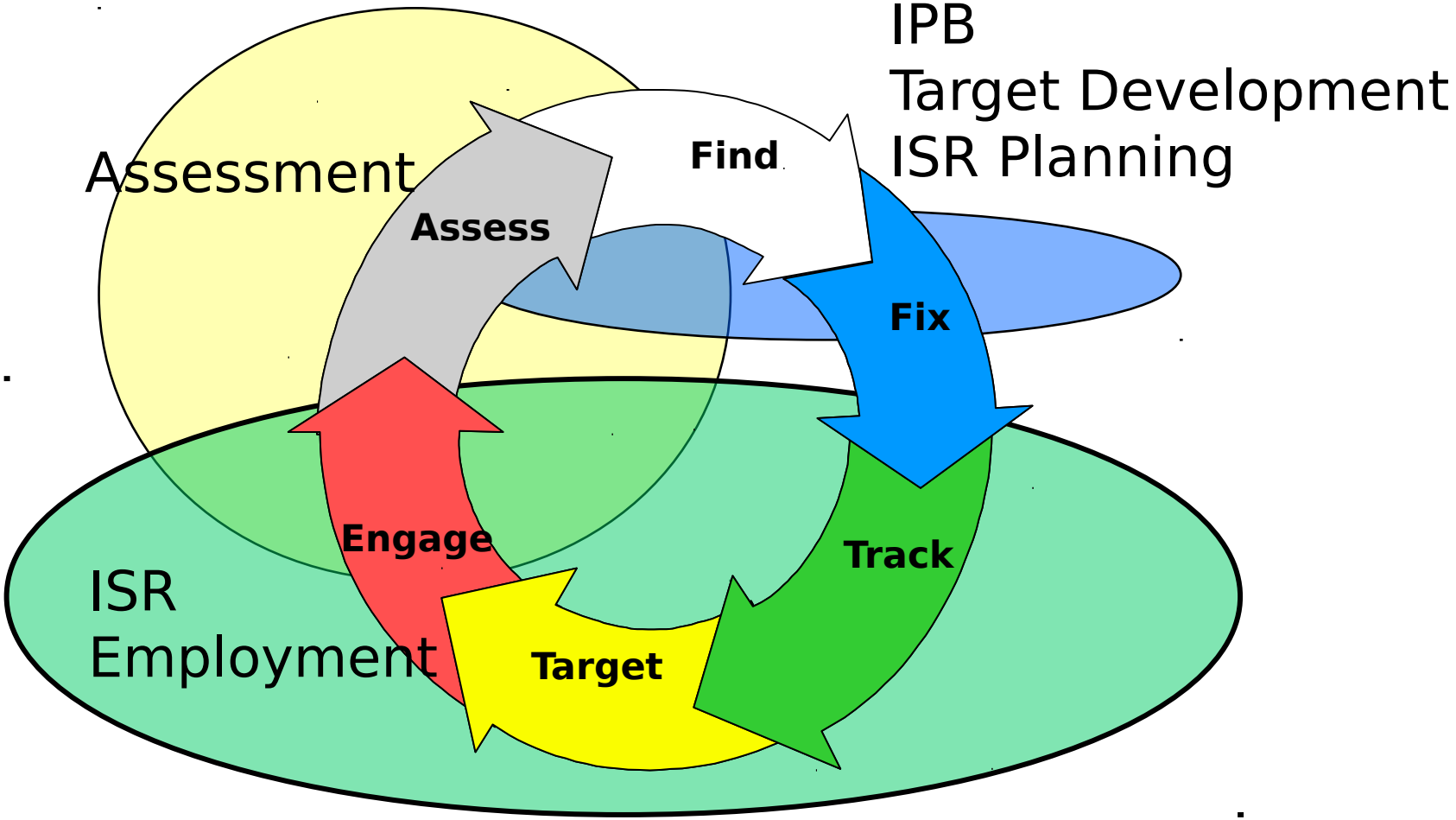
PBA in Kill Chain



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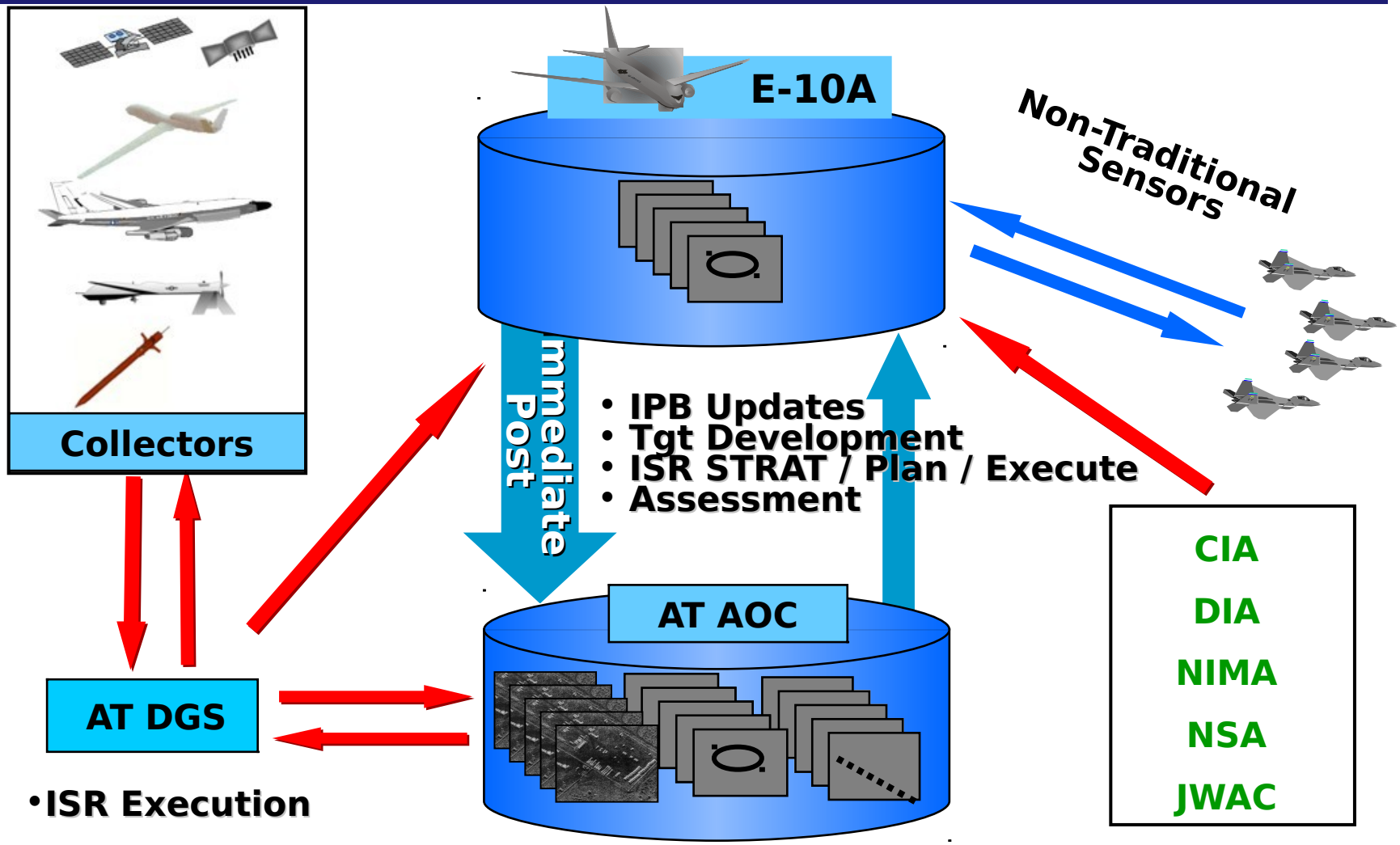
Continuous PBA



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Predictive Intelligence

- **Intelligence analysis drives the collection process**
- **IPB and target development predict:**
  - **Enemy / Adversary actions**
  - **Enemy / Adversary reactions**
  - **Operations effects**
- **Provides “tip-off” indicators to collections**
- **Assessment provides predictive intelligence with lessons learned – to enhance the next prediction**

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Collection Optimization Capabilities

Common Operating Environment

100AA3211	ARGUS
200ZZ1122	Motion
034BB3324	GMTI 1
034BB4444	EO/IR 1
035GG4929	ELINT 1
044VV42394	HSI 1
053-39393	SAR
099CC4884	NTM IMINT
888HH9499	COMINT
474FF4292	EO/IR 2
432JJ3823	Motion 2
555-84884	ELINT 2
555-12345	SBR
535FF4289	TAC RECCE

- Dynamic Sensor Management
- Collection Deck Prioritization
- Sensor- Target – Strike Synchronization

Prioritized Collection

Available Sensors

City Maps | ONC | JOG | TIBS | VIDEO | GCCS | OPELNT | TADIL | WX | ATO | GOB | TEOB | IMOM

UGS | UAV1 | UAV2 | UAV3 | RJ | JSTARs | AWACs | X000 | X000 | X000 | U-2 | ARL | EP-3 | P-3

Close Air Support | Interdiction | Air Defense

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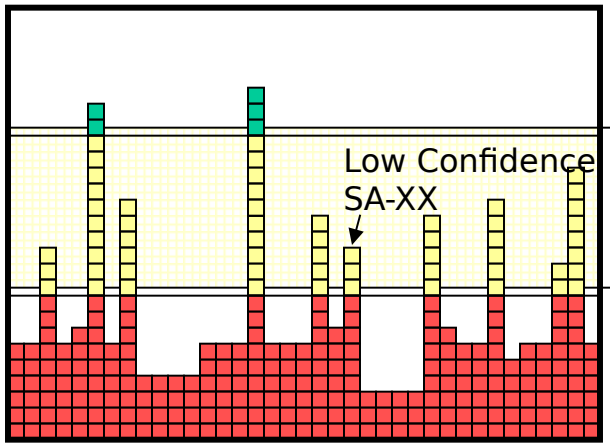
Today's Correlation Problem

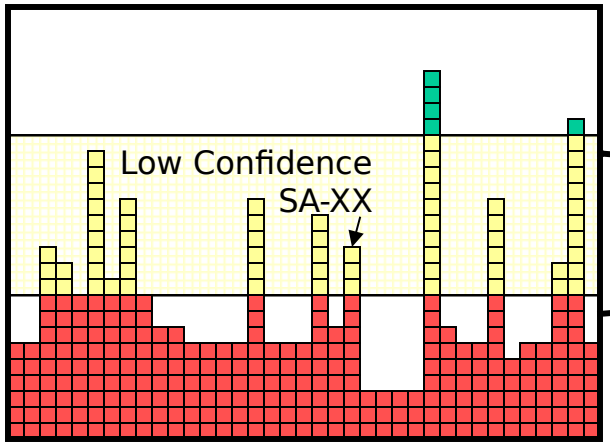
Platform 1 Picture



Reporting Threshold

Detection Threshold

Platform 2 Picture



Detected weak / short-up-time signals

No Report

No Report = No Action

Warfighter Sees No Target or Threat!

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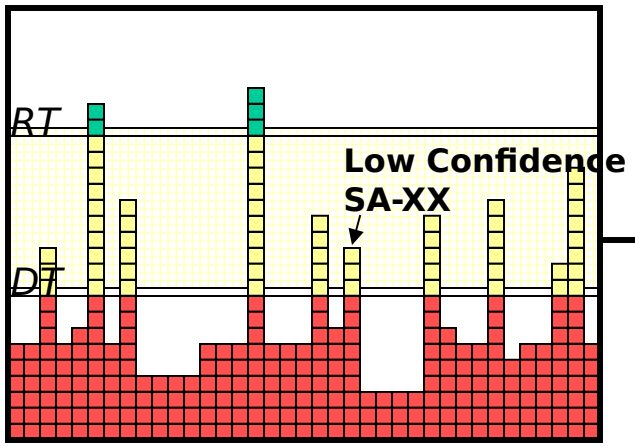
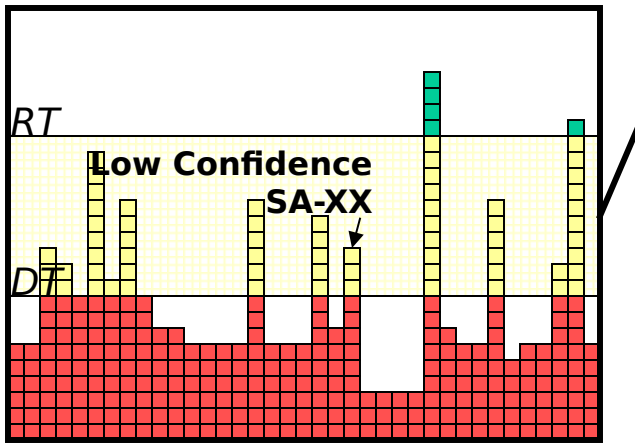
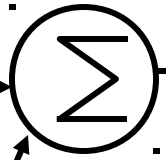
Tomorrow's Networked Solution

Platform 1 Picture

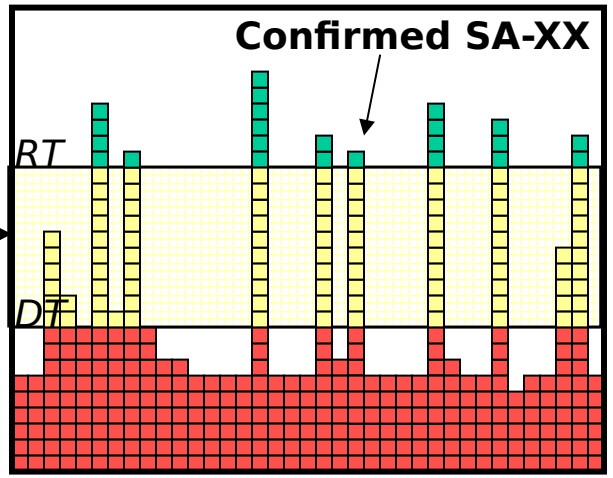


Platform 2 Picture





Fused Picture



Fusing Different Sensor Pictures Turns Unreported Detections Into Targets

Battle Managers Can Now Make Decisions Instead Of Comparing Data!

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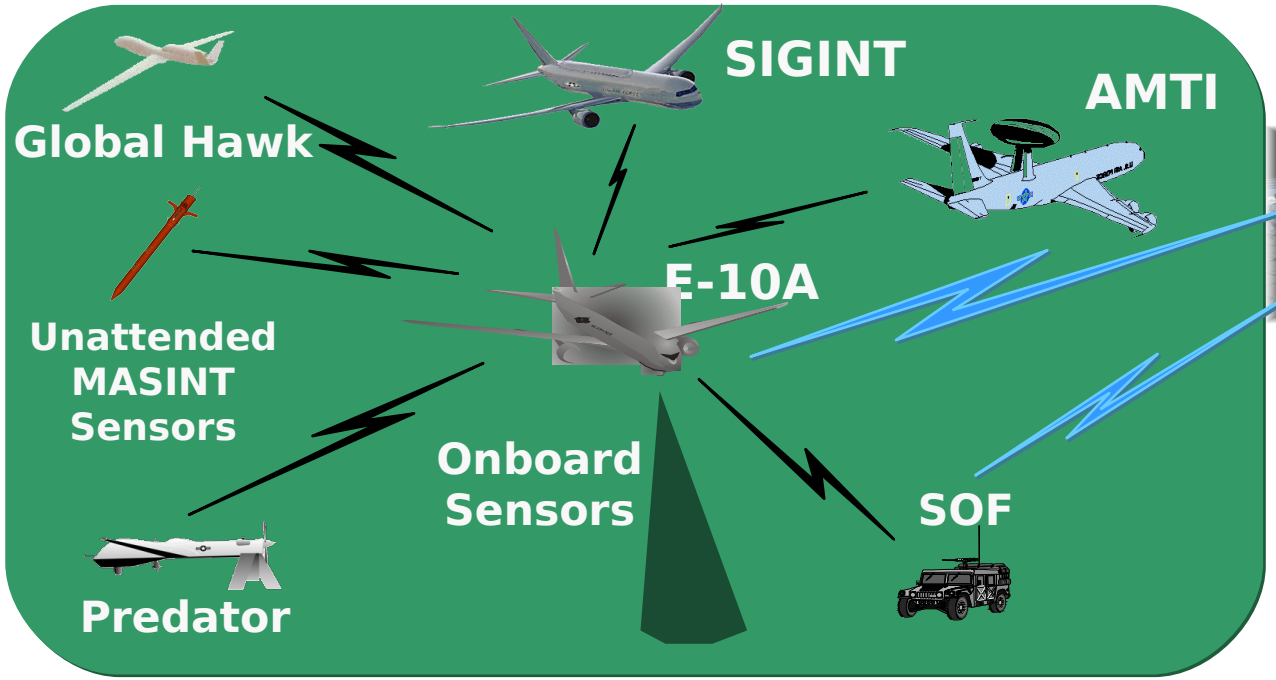
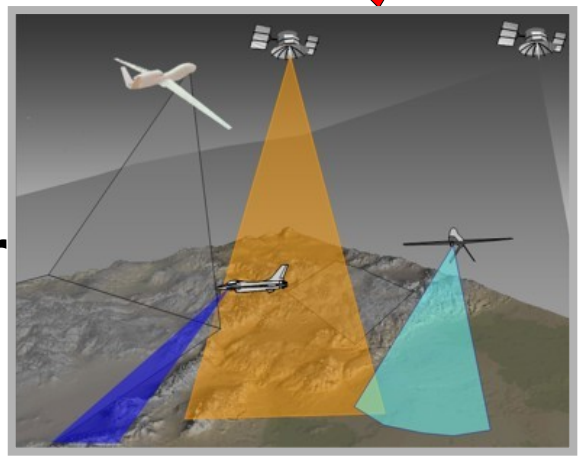
Dynamic ISR



AT AOC



- Sensor / platform - tasking / collabor
- ISR Visualization
- Common battlespace view

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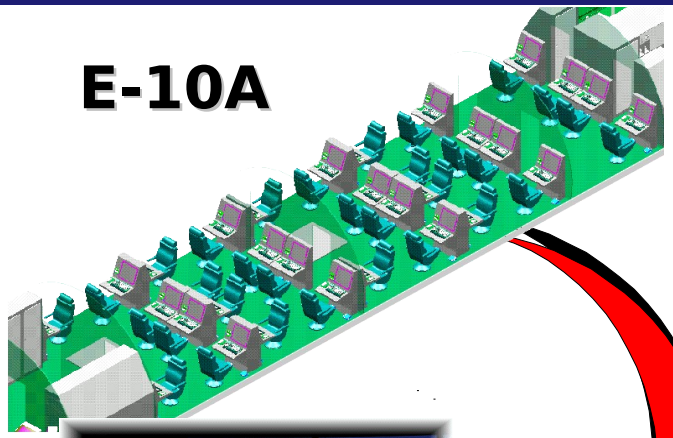
ISR Visualization Capabilities

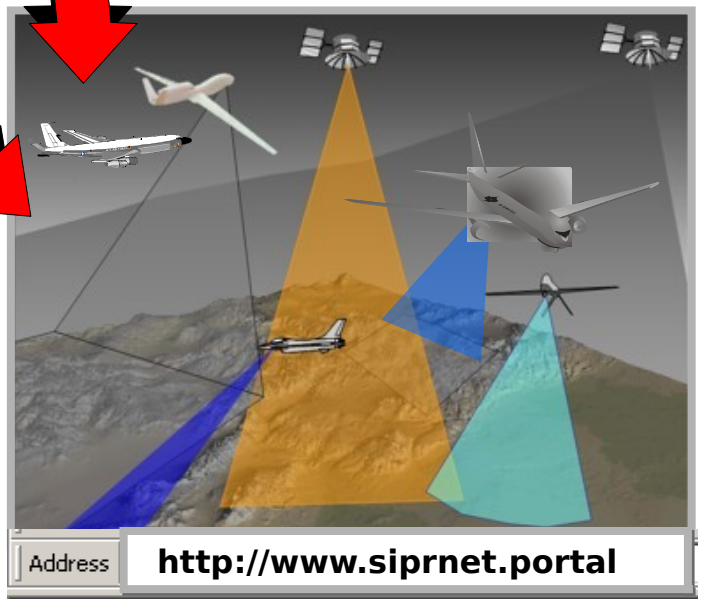
- Global Hawk (SIGINT)
- Global Hawk (IMINT)
- Predator
- SBR
- Rivet Joint
- Ground Sensors
- NTM
- TAC RECCE

E-10A



AT AOC

- Quick
- Agile
- Common battlespace view
- Dynamic tasking
- PBA



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Combat ID Capability

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Target ID Capabilities

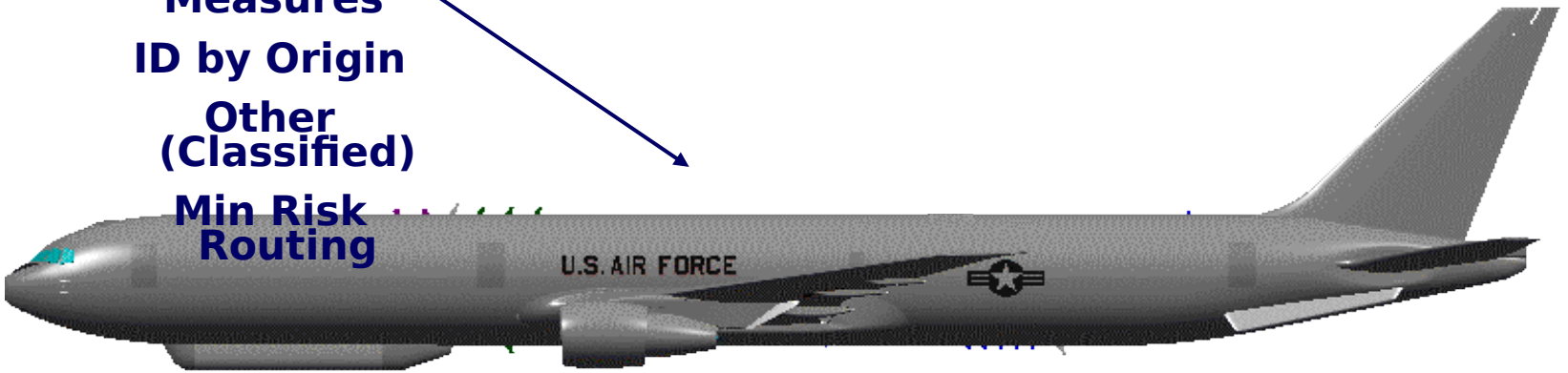
IFF/SIF

Electronic Support Measures

ID by Origin

Other (Classified)

Min Risk Routing



AESA Array provides:

High Range Resolution GMTI

High Resolution SAR Imagery

ENHANCED CID WITH COLLABORATED SENSORS

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ConstellationNet / NCI Panel Detail Slides

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ConstellationNet

Network Centric Warfare

Global Network Connectivity

NetOps Doctrine & TTPs

GIG Enterprise Services

Common Standards and Protocols

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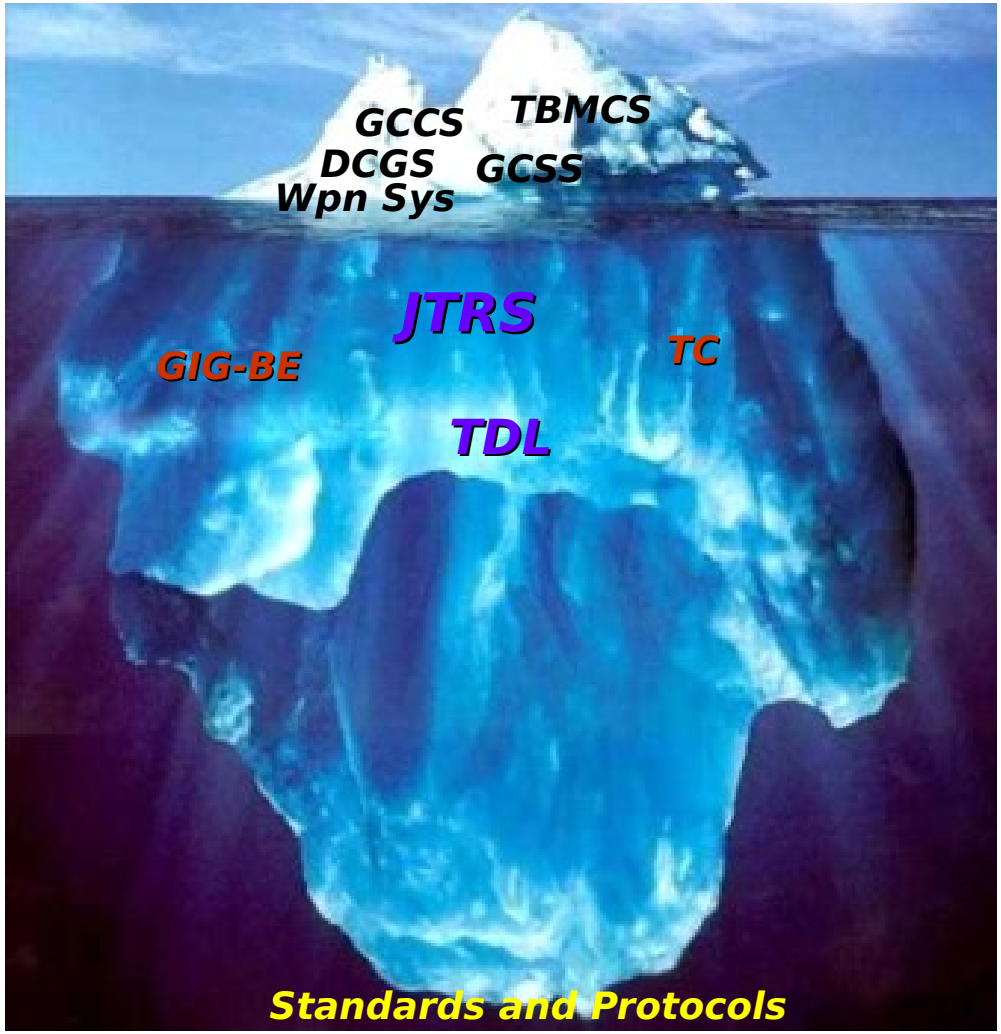
ConstellationNet The Goal

Today's "Network"

- *Platform-Centric Driven*
- *Link Focused*
- *Tied to Gateways*
- *Man in the Loop*
- *Stovepipe*
- *Bandwidth Constrained*
- *Proprietary H/W & S/W*



Future Network

- *Enterprise CONOPS Driven*
- *Capabilities Focused*
- *Seamless Interface*
- *Machine to Machine*
- *Interoperable*
- *Bandwidth on Demand*
- *Common GOTS S/W*

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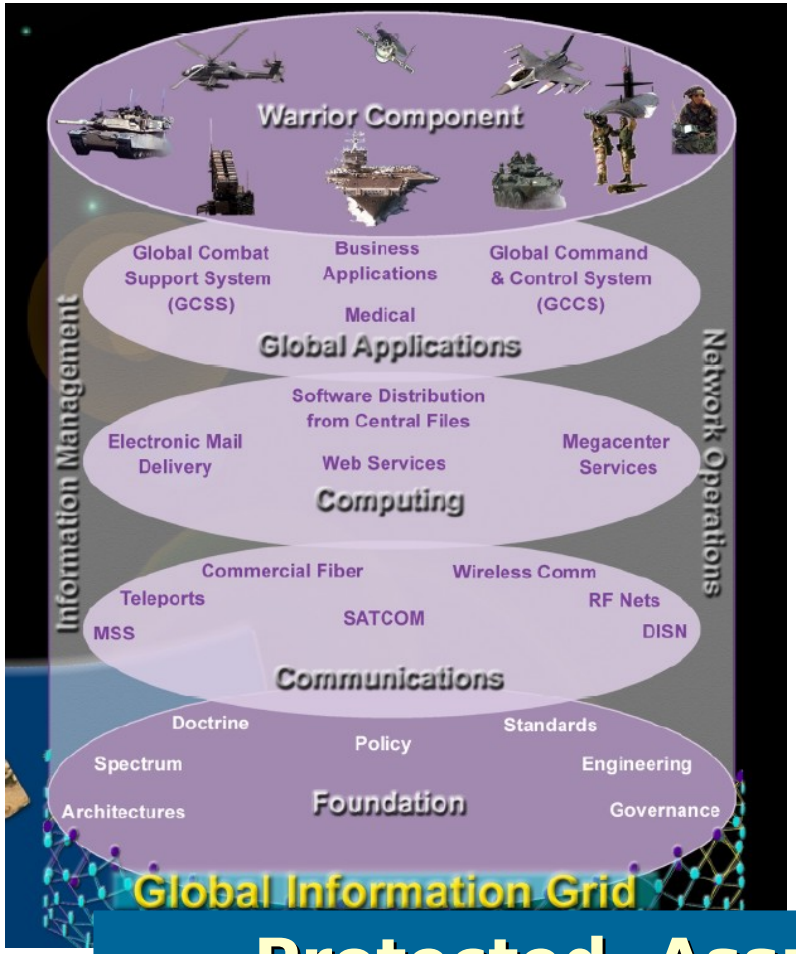
Network-Centric Warfare Enabling Vision: Global Information Grid



- A single secure Grid providing seamless end-to-end capabilities to all warfighting, national security, and support users
- Supporting DoD and Intelligence Community requirements from peace time business support through all levels of conflict
- Joint, high capacity netted operations
- Fused with weapons systems
- Supporting strategic, operational, tactical, and base / post / camp / station
- Plug and Play interoperability
  - Guaranteed for US and Allied
  - Connectivity for Coalition users
- Tactical and functional fusion a reality
- Information / Bandwidth on demand

Protected, Assured, Interoperable Information

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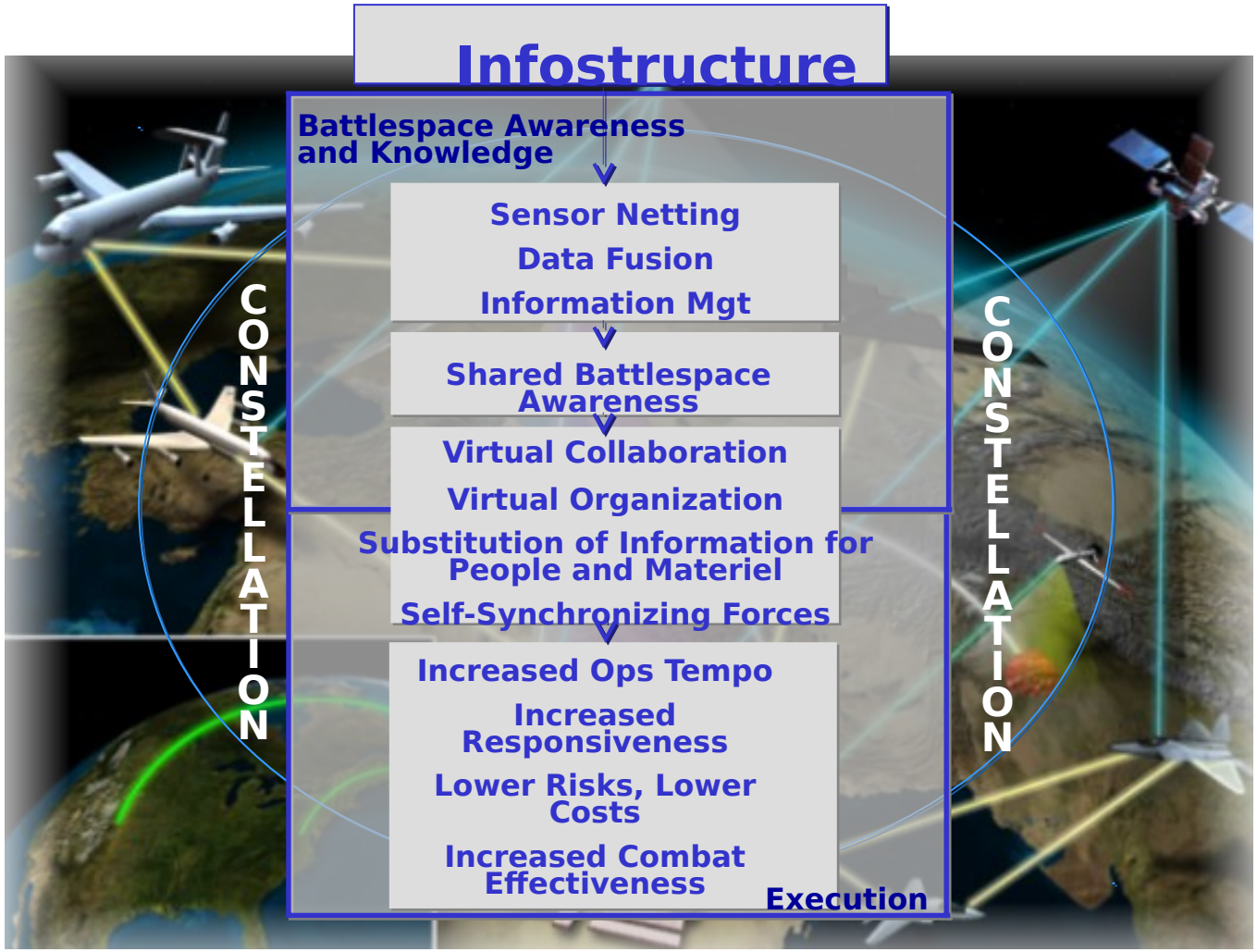
Constellation
AF Network-Centric Warfare Enabler



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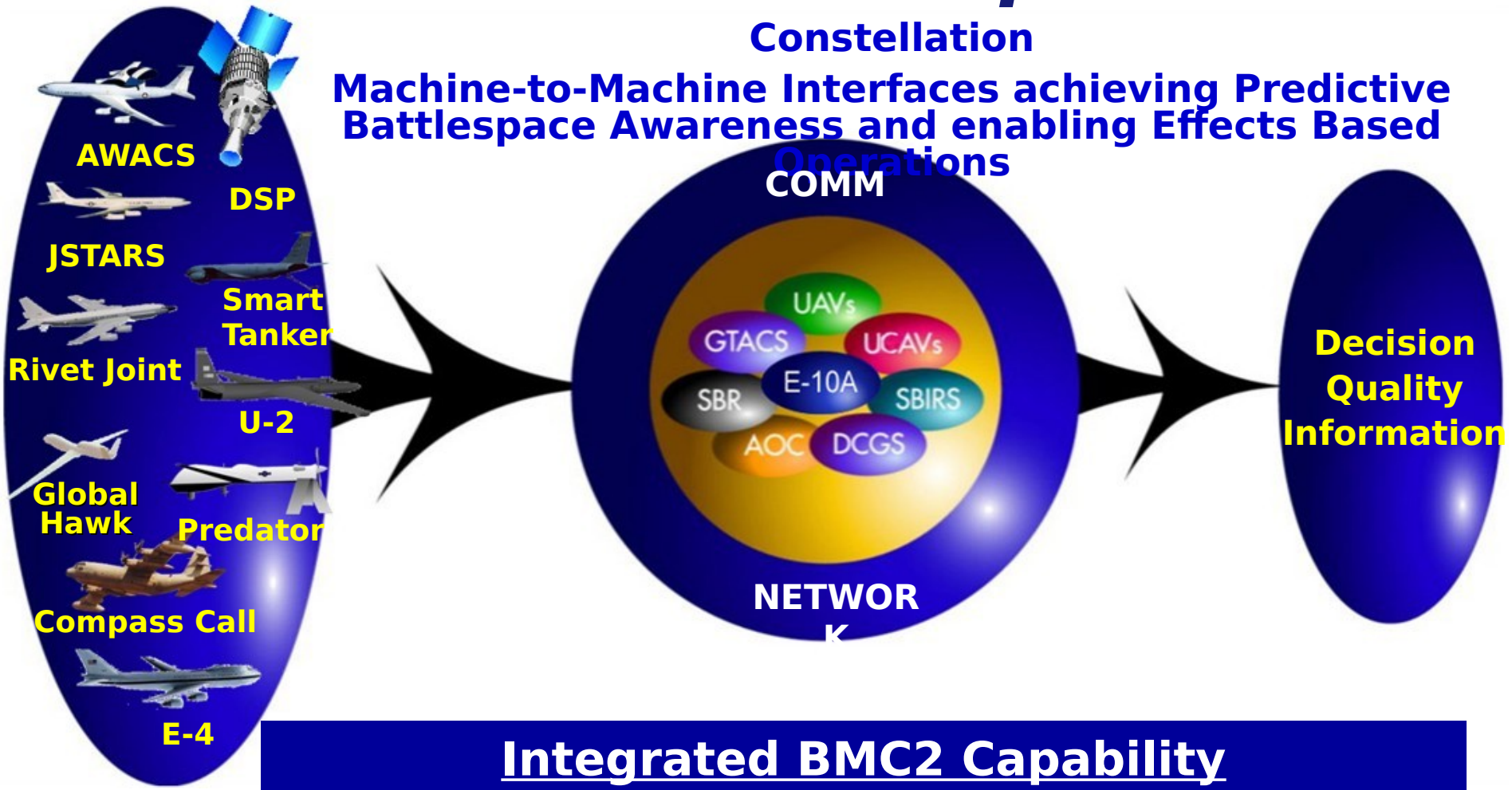
Horizontal Integration Capabilities

Constellation

Machine-to-Machine Interfaces achieving Predictive Battlespace Awareness and enabling Effects Based Operations



Integrated BMC2 Capability

GMTI AMTI ELINT COMINT MASINT IMINT HUMINT

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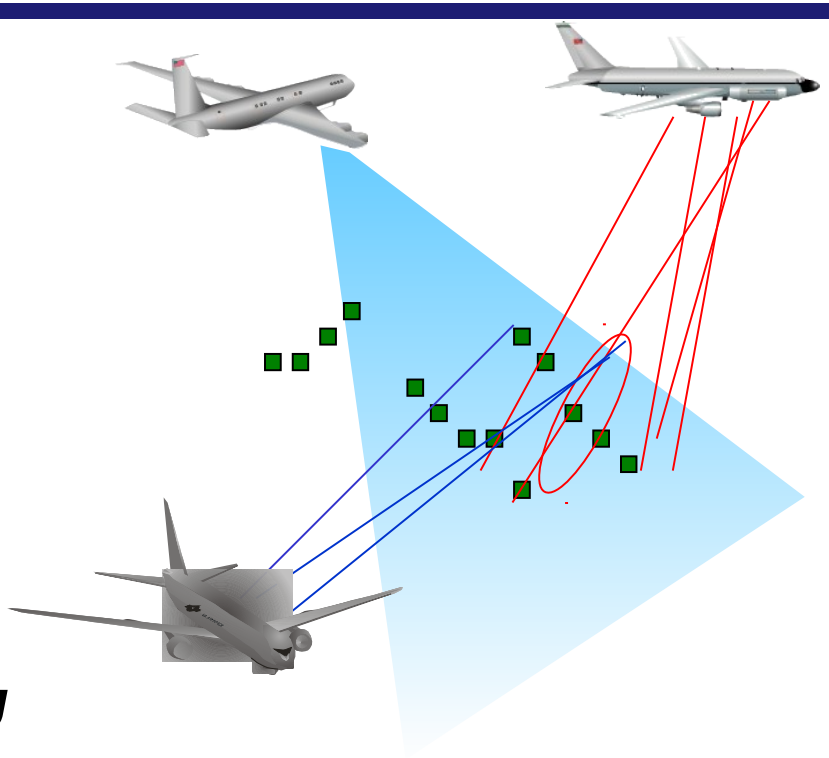
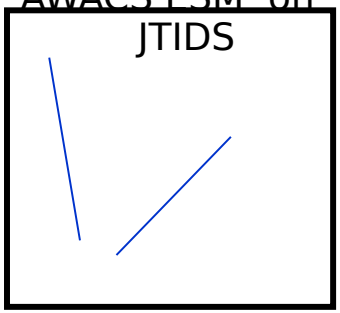
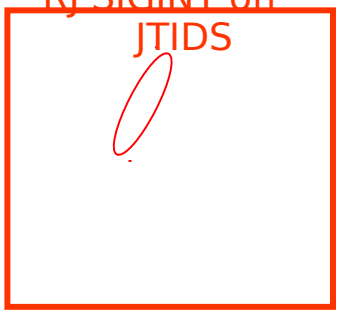
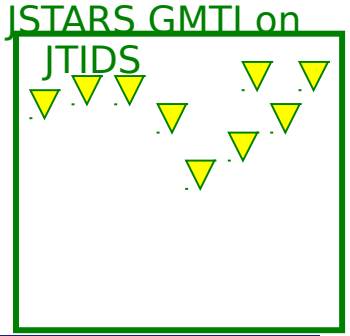
ISR Today Capabilities

- ***Platforms get unique pictures***
- ***Voice and link sharing of data***
- ***Grey Matter Fusion to dig out targets***









Sequential Reporting and Manual Correlation of Randomly Sampled Events

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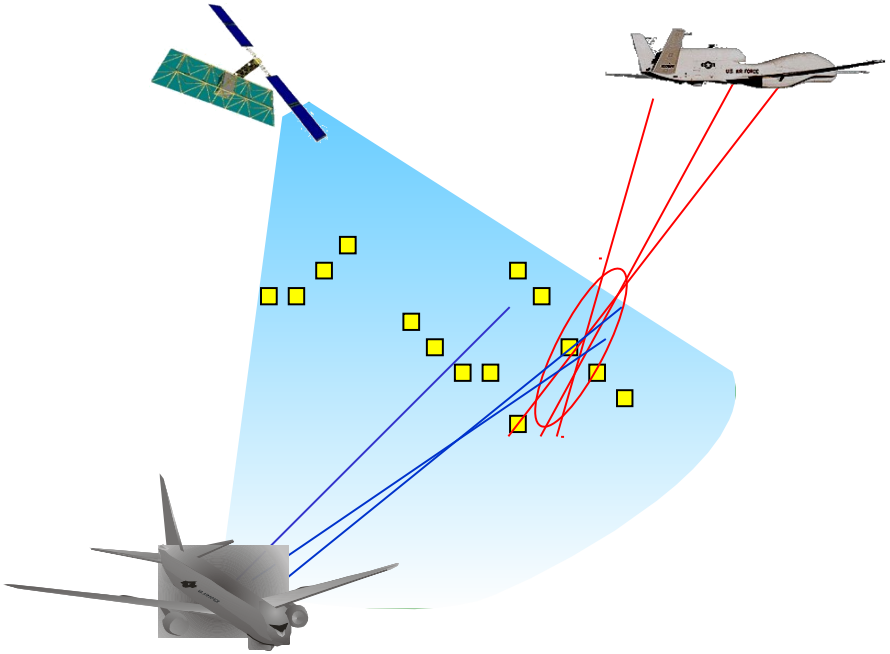
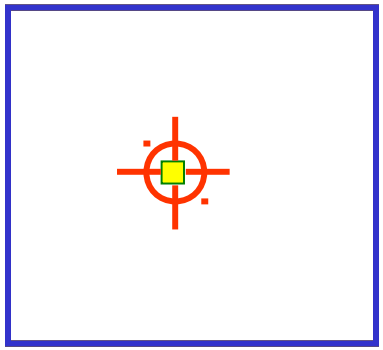
Machine to Machine ISR Capabilities

- *Employ platforms as a Network*
- *Synchronize Multi-INT Sensors*
- *Common Applications and Processing*
- *Common Display*



User's View



Actionable Information-Zero Latency Environment

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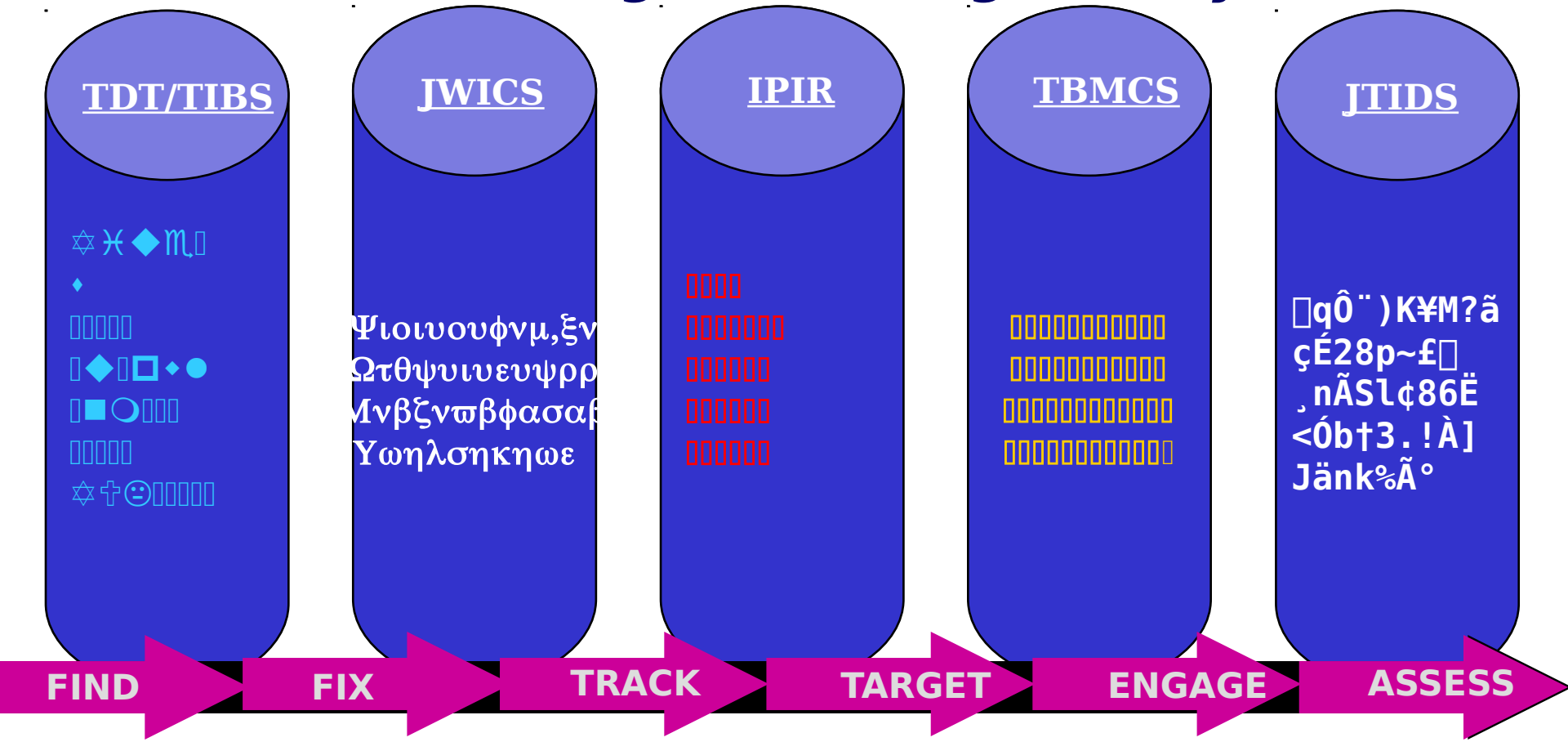
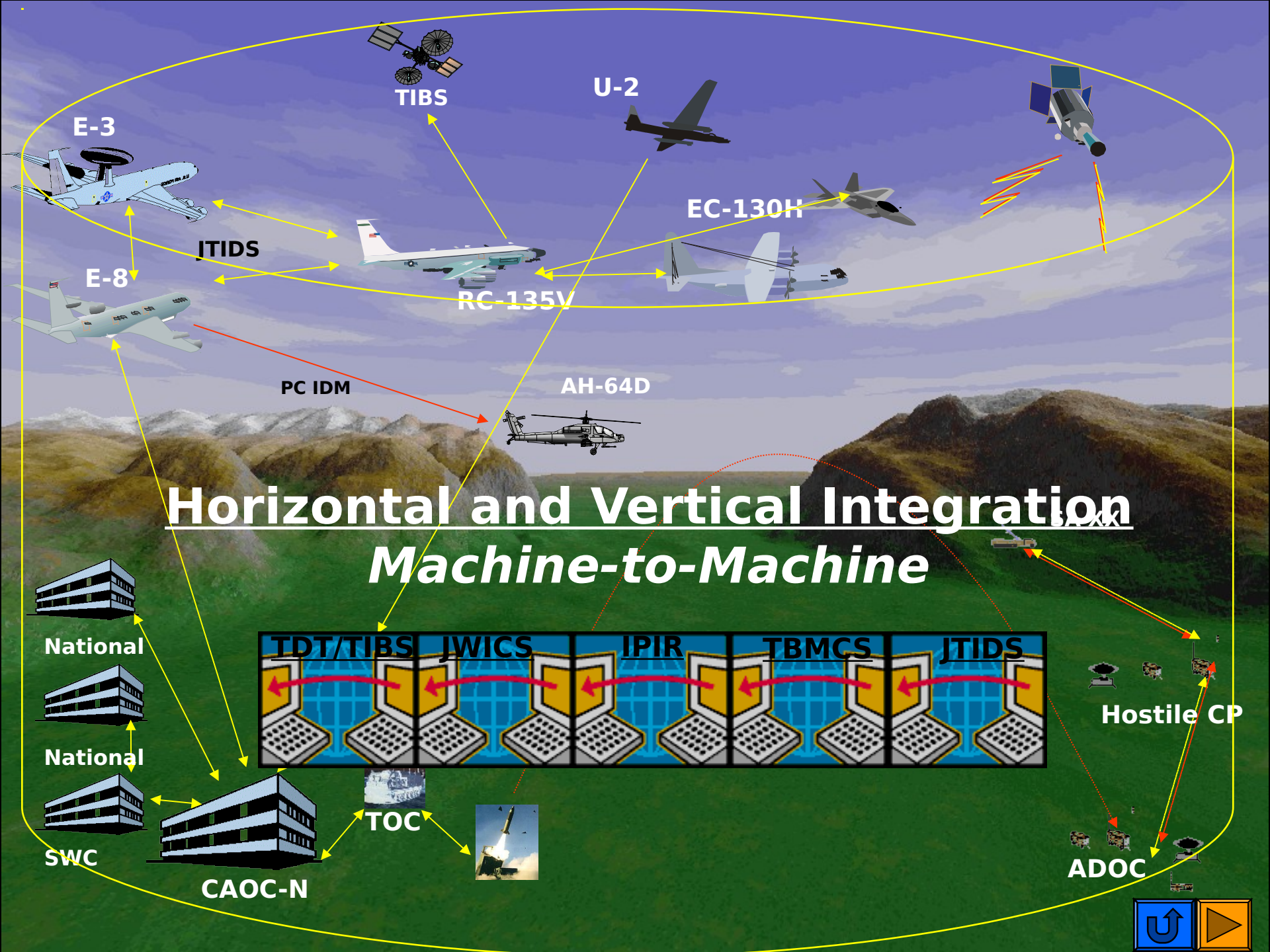
The Perennial Problem
"Tribal Hieroglyphics"

Forcing Info through the system




TIBS
U-2
E-3
EC-130H
JTIDS
E-8
RC-135V
PC IDM
AH-64D
Horizontal and Vertical Integration
Machine-to-Machine
SA-xx
National
National
SWC
CAOC-N
TDT/TIBS
JWICS
IPIR
TBMCS
JTIDS
TOC
Hostile CP
ADOC

Machine to Machine Level Interactions: JEFX TCT Example

- **Objective: Compress kill chain via machine to machine interaction**
- **Time Critical Targeting Functionality (TCTF) produces target brief through 6 Battle Management "machines"**

1

- **TCTF takes ATO, Air Battle Plan and intelligence baseline from TBMCS "machine", adds products of …**

2

- **Terrain Analysis "machine" (DTSS) that provides topographic targeting info to the…**

3/4

- **IPB "machine" (A2IPB) which takes sensor product information from the Sensor Management "machine" (ISR M) and sends Target Areas of Interest and Courses of Action to the …**

5

- **Target Development "machine" (JSWS) which sends Time Critical Targets to the …**

6

- **Weapons Pairing "machine" (WTP) that pairs aircraft sorties against TCTs producing the 9-line Pilot - FAC briefing**

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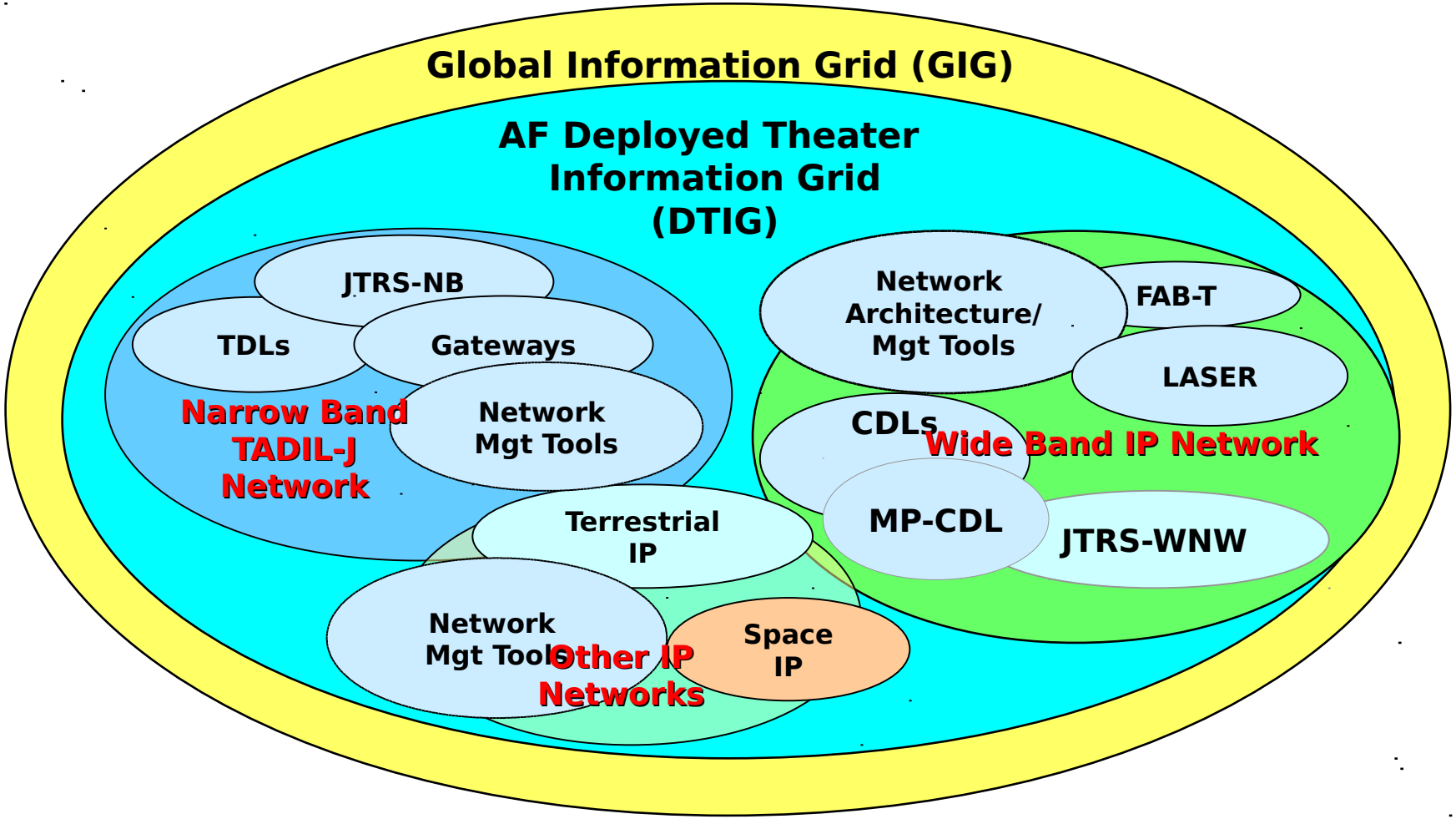
Global Information Grid and the AF DTIG



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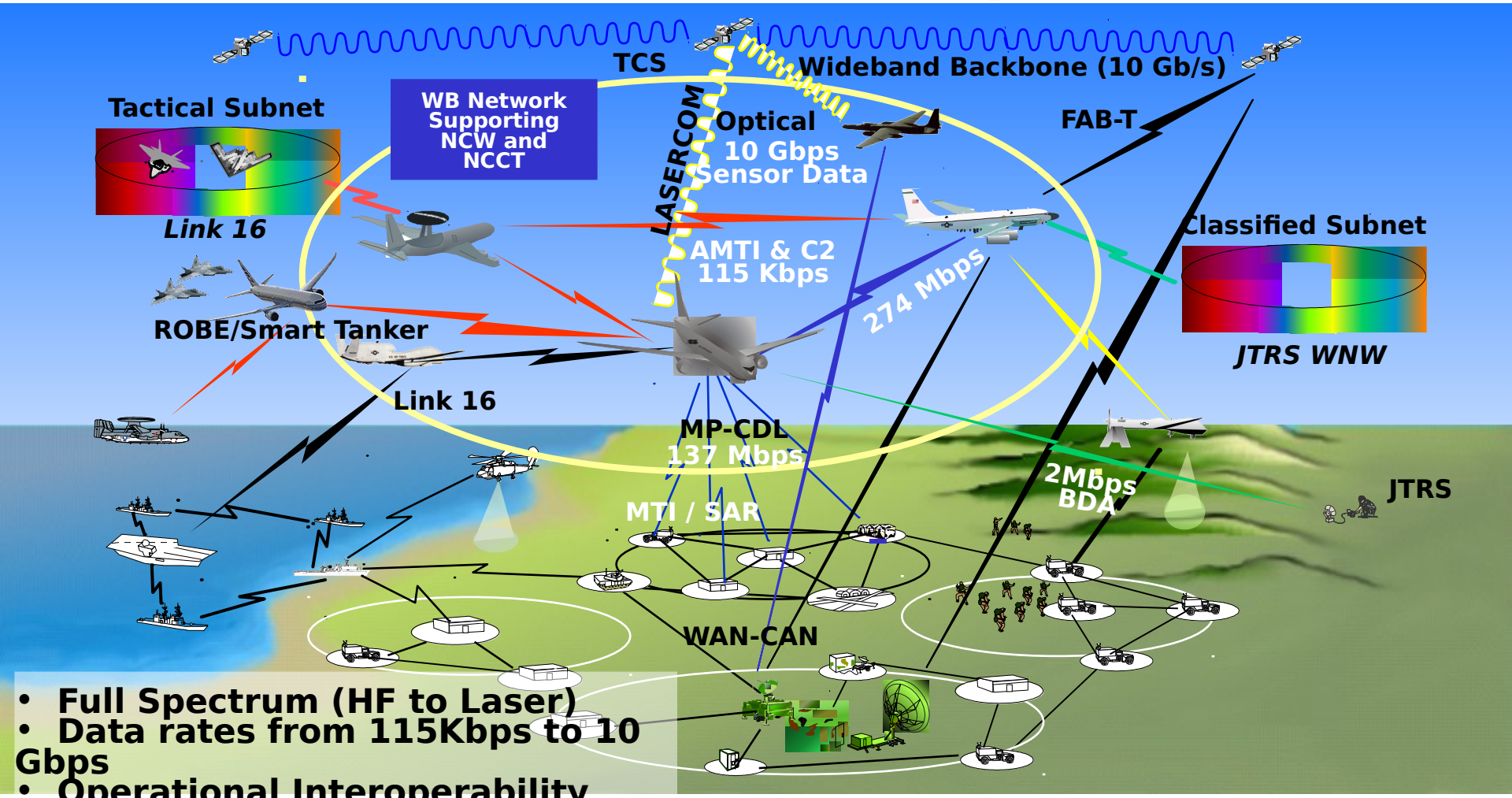
Communication Capabilities



- Full Spectrum (HF to Laser)
- Data rates from 115Kbps to 10 Gbps
- Operational Interoperability
- Zero latency environment

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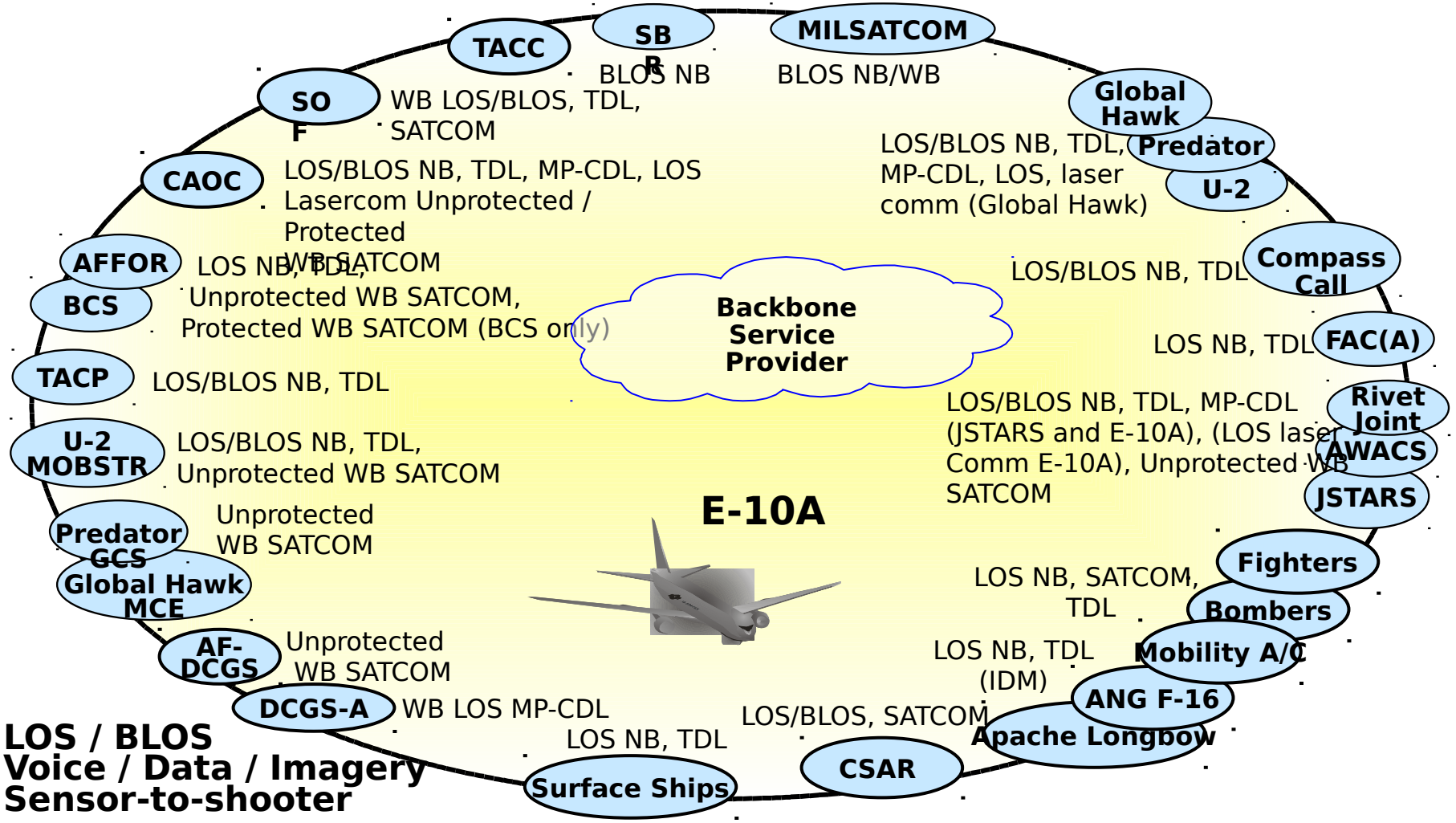
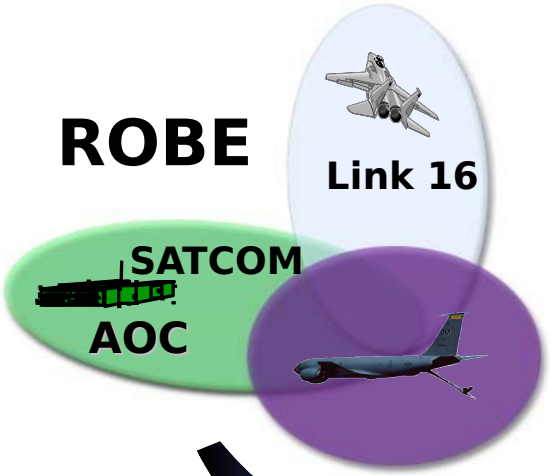
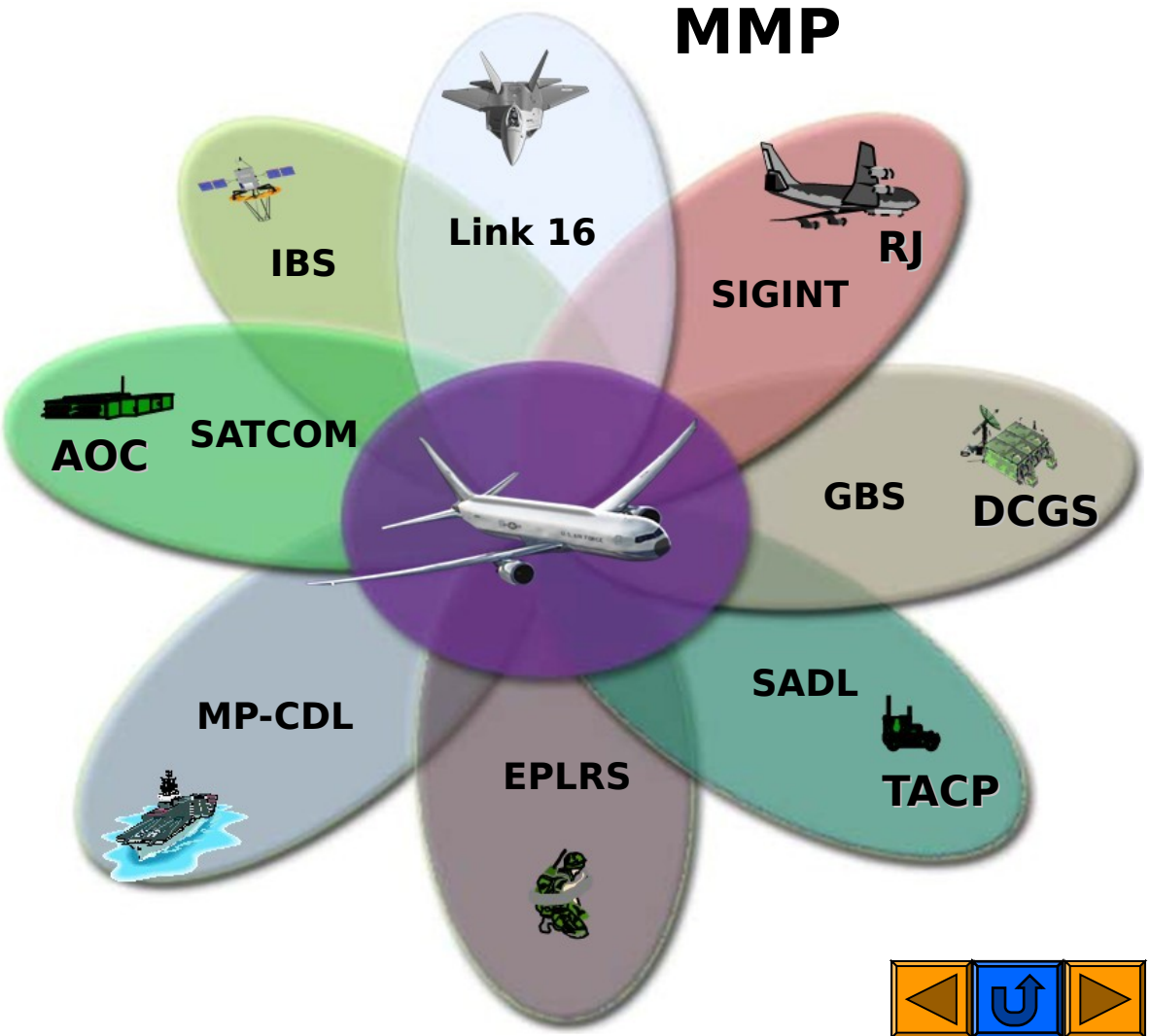
Communication Capabilities (Cont.)



- **LOS / BLOS**
- **Voice / Data / Imagery**
- **Sensor-to-shooter**

SMART Tanker Capabilities Growth

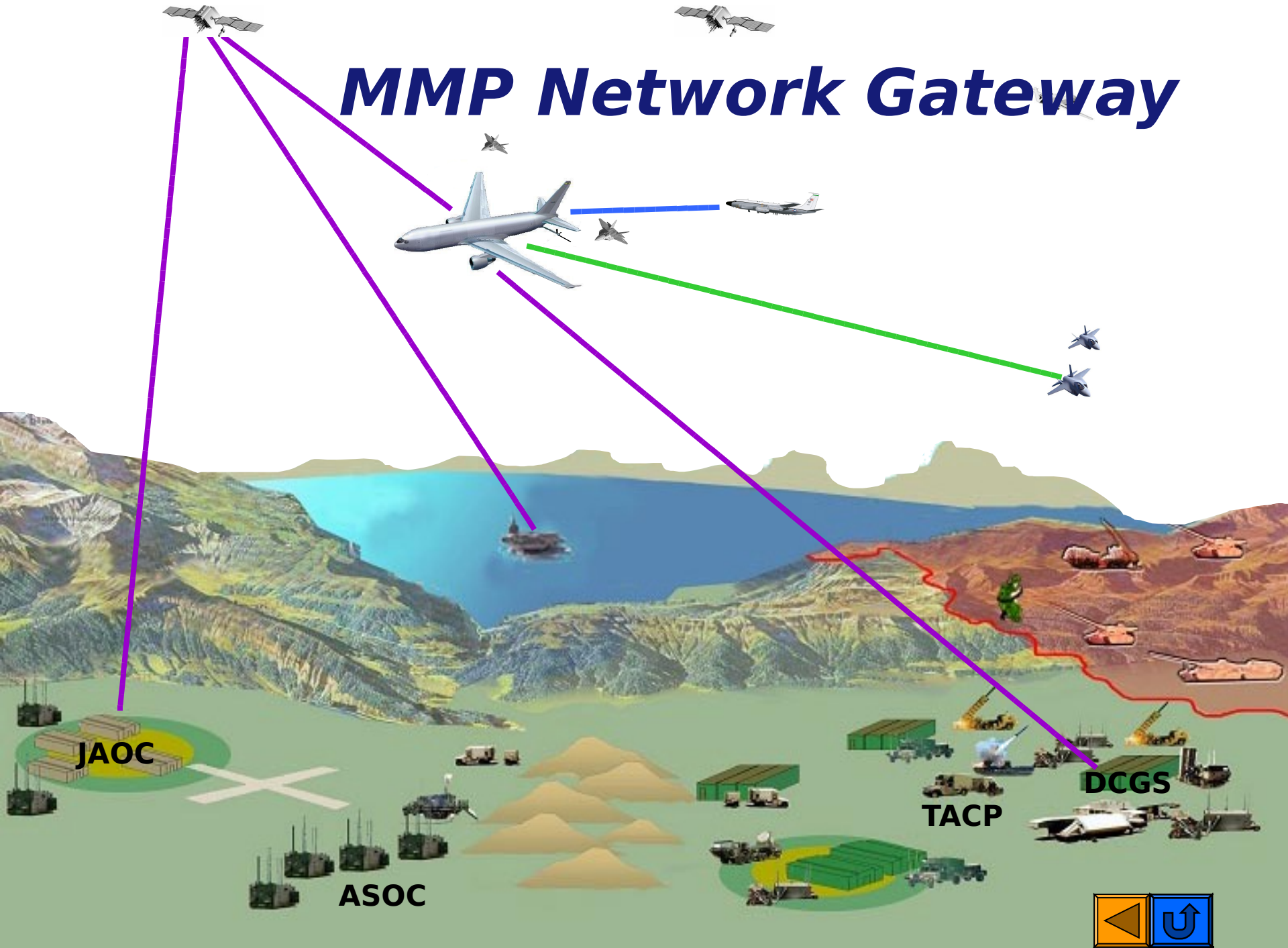




ROBE (KC-135)
Roll-**O**n **B**eyond-Line-Of-Sight
Enhancement

MMP (KC-767 or others)
Multi-**M**ission **P**ayload

MMP Network Gateway



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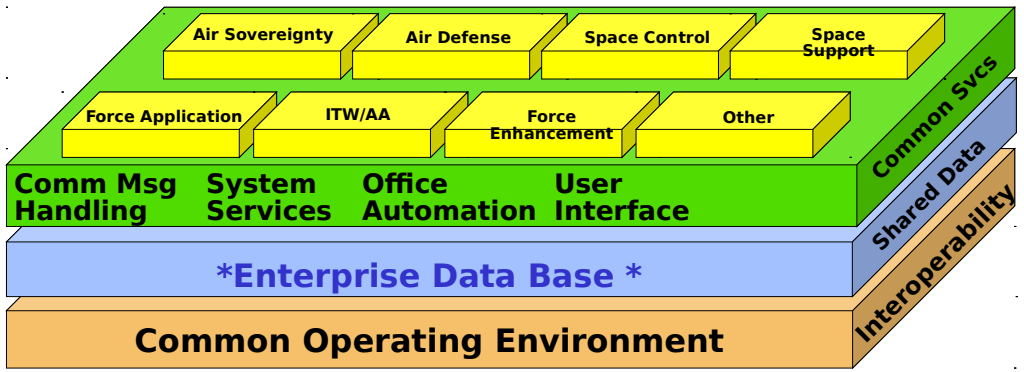
Defining the Constellation Infrastructure

- Network-Centric Enterprise Services
  - Open Systems Approach, non-proprietary systems
- Commercial Standards
  - Data, Interfaces & Protocols
- Open, network-centric architecture
  - Leading to Joint Interoperability
- Commonality of H/W, S/W and data



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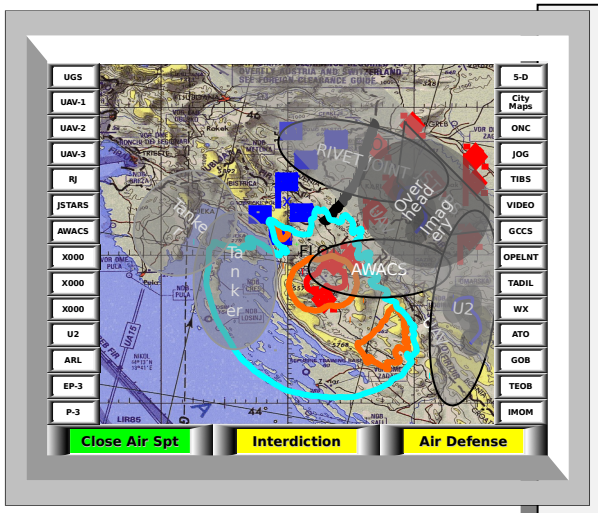
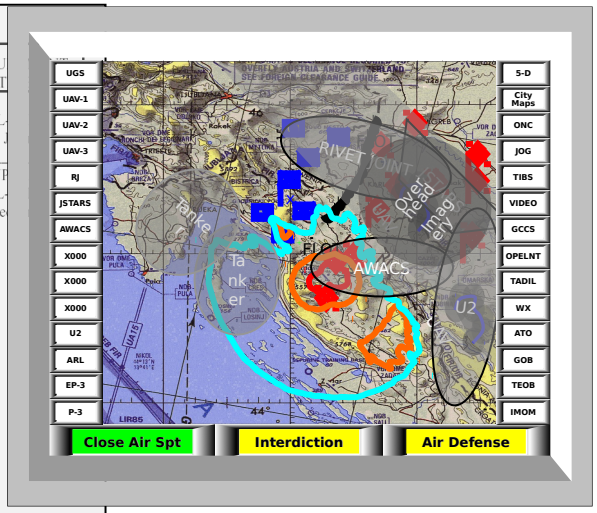
Commonality

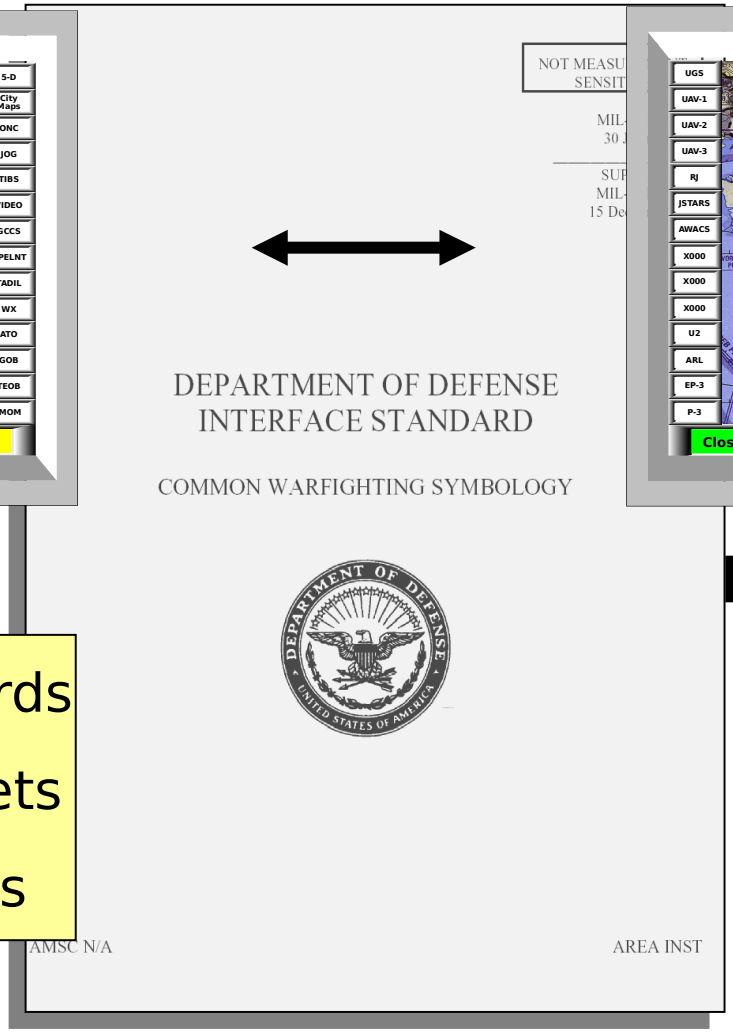


AT AOC VIEW



E-10A VIEW

- Common Standards
- Common Data Sets
- Common Displays



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Tidewater C2 Community

- **Joint C2 requirements stakeholders**
  - Joint - JFCOM
  - USAF - AFC2ISRC & ACC
  - USN - NETWARCOM
  - Army - TRADOC
- **Overarching concepts**
  - Joint Force C2
  - C2 Constellation
  - FORCEnet
  - Objective Force
- **C2 capabilities**
  - Joint Battle Management C2
  - Battle Force C2
  - Battle Management C2
  - Battle Command System

Currently developing Family of Interoperable Operational Pictures (FIOP)
integrated air, ground, maritime pictures

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Joint C2 Capability

- **JC2 ORD**
  - **Provide all combatant commanders a baseline command and control capability**
  - **SJFHQ – Defining the capabilities, systems and personnel required for baseline Command and Control for Joint Force Commanders**
  - **DJC2 - Acquisition program to field modular, expandable, deployable Joint C2 Headquarters for use by Combatant Commanders and JTF commanders**
- **JBMC2**
  - **Achieve SecDef's Interoperability and Connectivity mandate**
  - **JFCOM J-8 lead**

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USJFCOM's Joint BMC2 Tasks

- **Mission: Effective immediately, USJFCOM assumes responsibility for Joint BMC2 to lead operational to tactical interoperability and address Combatant Commanders' needs**
- **Tenets:**
  - **Joint Influence (USJFCOM-led, Combatant Commanders, and Service / Agency-involved Requirements process which prioritizes Combatant Commanders' needs)**
  - **Conduct System-of-System Engineering Trade-Offs**
  - **Service / Agency Implementation (sustain current acquisition life-cycle responsibilities)**
  - **Start relatively small and implement aggressively in FY03**

Headquarters U. S. Air Force

Integrity - Service - Excellence

AIR FORCE – NAVY C2 & ISR Synergy Opportunities

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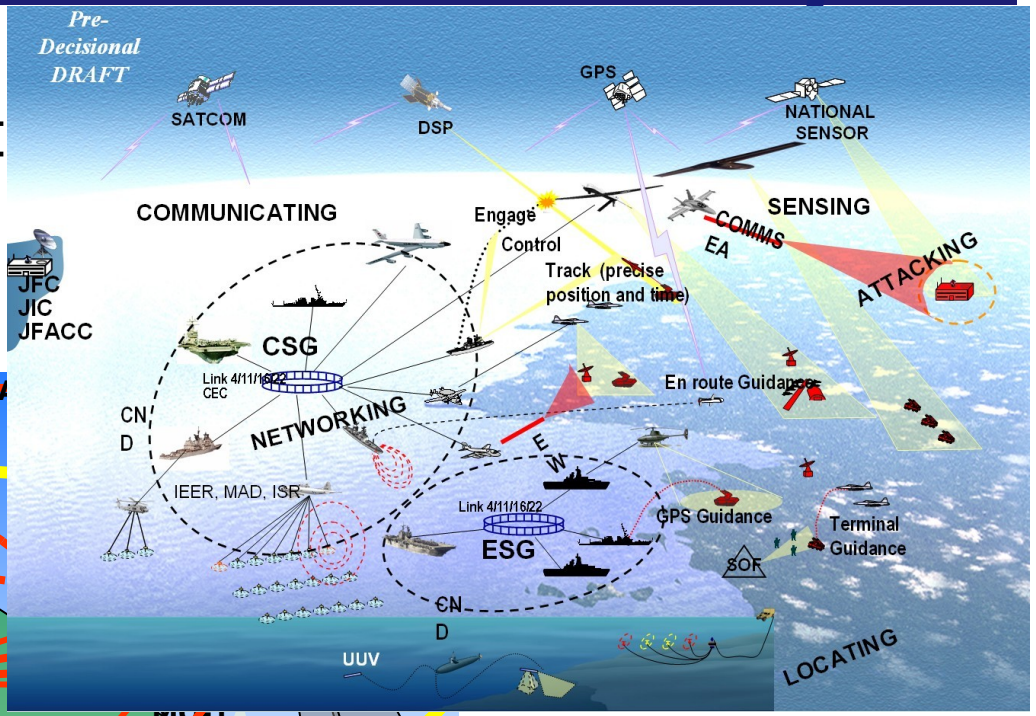
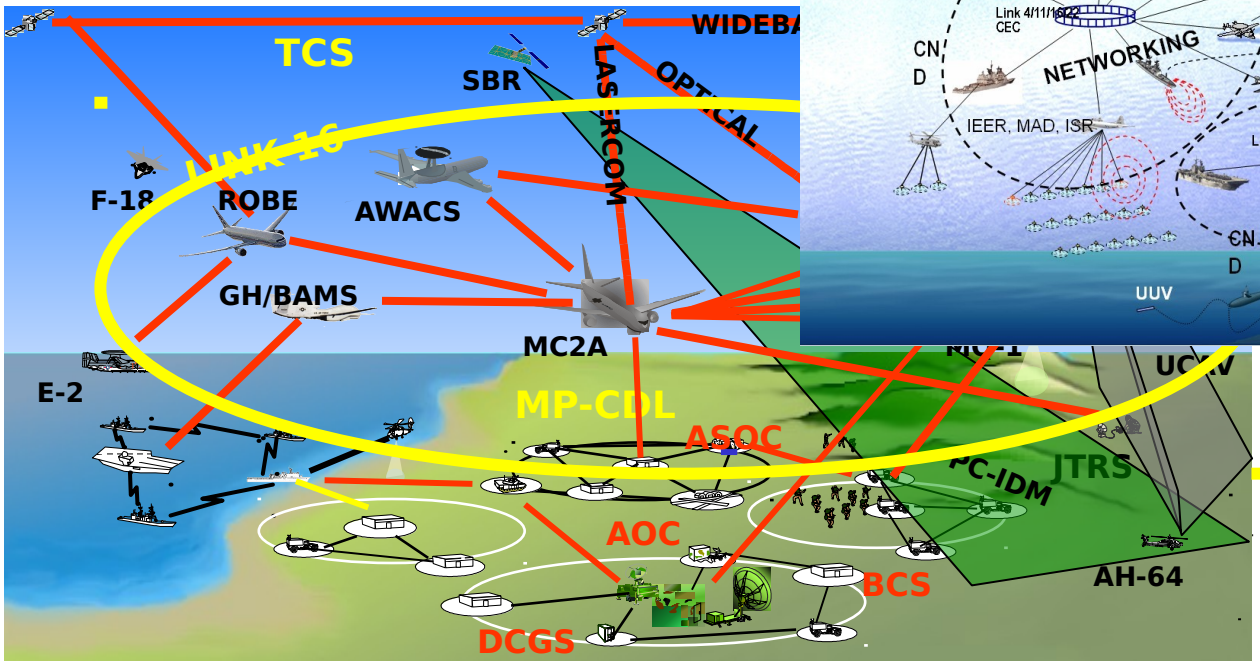
Joint Service Relationships

Navy FORCEnet





AF C2 Constellation

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Top Candidates

- Joint Tactical Radio System (JTRS)
  - Combine Clusters 3 and 4
  - Study ongoing
- Tactical Data Links (TDL)
  - Joint Concept of Link Employment (COLE)
  - Common Roadmap
- ISR and Architectures / Requirements / Standards
- Time Critical Targeting (TCT) / Time Sensitive Targeting (TST)
  - Distributed Common Ground System 10.2 (DCGS)
  - Joint Fires Network (JFN)
- C2 Systems
- Joint Mission Planning System (JMPS)

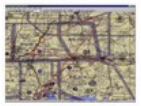
Joint Navy / Air Force Current Efforts

TODAY:
PROGRAM SPECIFIC SOLUTIONS

FY03-04:
CONSOLIDATED SYSTEMS

FY06-10:
TRANSFORMATIONAL JOINT CAPABILITIES

ISR FUSION



AIM POINT MENSURATION

INTEL MANAGEMENT

COMMANDER'S DECISION

- DCGS - AF
- DCGS-N (JSIPS / GCCS / TES)

→ **DCGS 10.2**

- RAINDROP
- PTW

→ **PTW +**

- ISR BM
- SRMT / PORTAL

→ **DCGS – ISR MANAGER**

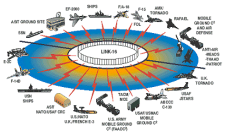
- AF TBMCS
- GCCS-M

→ **JC2**

FORCENET

C2 CONSTELLATION

Joint Navy / Air Force Future Efforts

	TODAY: PROGRAM SPECIFIC SOLUTIONS	FY03-04: CONSOLIDATED SYSTEMS	FY06-12: TRANSFORMATIONAL JOINT CAPABILITIES
 SENSOR FUSION	Link 11/16/22 Link 16 COLE	6016C / SLIR JRE	COMMON SENSOR STRATEGY
INTEL MANAGEMENT	AP4-6 JSTARS	SBR / Global Hawk / BAM	
PLATFORM FUSION	F-14 F-15E	JSF	COMMON WEAPONS PLATFORM
COMMUNICATION COLLABORATION	CLUSTER 3 FIXED SITES CLUSTER 4 AIRBORNE	JTRS	COMMON COMMUNI-CATIONS

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Way Ahead - Update

- **Continue to work towards common responses to key issues, e.g. DJC2 Program Office Location, MID 912, CJCSI 3170, DoD 5000, JFCOM Resource Authority, etc.**
  - **Status: Ongoing, with bimonthly, focused, meetings between the AF and Navy Tidewater and DC 3 and 2 star levels!**
- **Determine near-term vs long-term opportunities**
  - **Status: Near Term (JFN Roadmap (DCGS, PTW/Raindrop); FN/C2C Sensor Strategy: Converging ISR architectures; TSTCONOPS/TSTMTTP; SLIR/6016C; . . . .); Long Term (JTRS Cluster 3, 4; TCA; SBR; converging Network Architectures for FORCEnet and CONSTELLATION; inviting USMC and USA; TDL Roadmap; . . . .)**
- **Brief to 24 Jun 03 Joint Navy-AF Warfighter Talks**
  - **Status: Being prepared; being staffed at N6/7 – XI Flag level; tabled until new date for next Warfighter Talks; but a progressing success story to be briefed collectively by VADM Mayo and Maj Gen Behler**

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Way Ahead – Update (Cont.)

- **Combined AF / Navy pitch to JFCOM - “Sub-contractors” for JC2/JBMC2**
  - **Status: Done – Col Buster Burns briefed Mr. Derganc and Maj Gen Dick on the utility of using the Transformation Center for exploring JFACC and BMC2 interoperability issues (02/03)**
  - **Separately, in discussions with J86, N8 has advised NETWARCOM’s goals are JOINT, JOINT, JOINT**
    - **Naval**
    - **Partnering with AF C2ISR Center**
    - **Subcontracting to JFCOM J86 JI&I for BMC2 Interoperability (04/03)!**
  - **Next step could be the linking, ala JDEP, the Transformation Center, Navy BMC2 Prototyping facilities (San Diego, Dahlgren, Patuxent River, Newport), USMC (Quantico) and USA (Ft Monmouth and Ft Belvoir CECOM R&D Center) with the JFCOM Battle Labs and J9 Experimentation Cells.**

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Way Ahead – Update (Cont.)

- **AF host next meeting…approx 90 days General discussion, plus side-bars focused on specific topics.**
  - **4 and 5 June**
- **Need an "S&T version" of this…combine efforts to fix the really hard, longer-term stuff**
  - **Status: Navy SPAWAR sponsored Joint Development Technology Insertion Working Group, and ONR Knowledge Superiority Assuredness Future Naval Capabilities (FNC) should partner with the Center CTT future technology meetings**

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Recommended Next Steps

- **NETWARCOM and AFC2ISRC**
  - **Further study AF – Navy C2 Synergy Candidates**
  - **Explore areas of commonality and make recommendations to improve joint C2**
- **Develop Joint C2 Architecture**
  - **Team with JFCOM J8 JI & I**
- **SPAWAR and ESC**
  - **Examine ongoing initiatives to determine areas of overlap and/or duplication**
  - **Recommend ways to synergize efforts**

End Hyperlink Section

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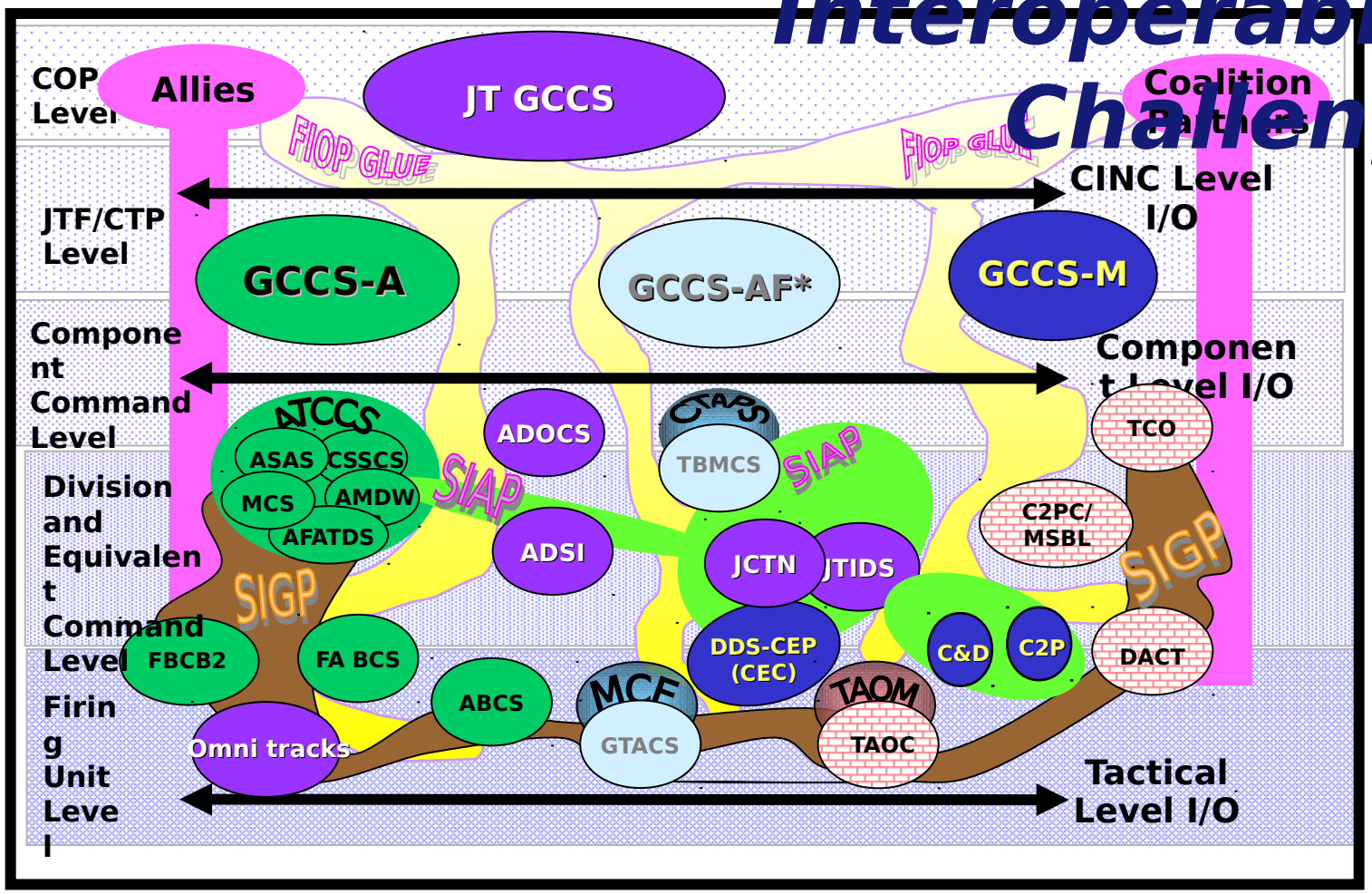
Operational to Tactical Level Interoperability Challenges



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Desired End State

BMC2: People, Process, & Technology

Integrity - Service - Excellence

BMC2 Integration

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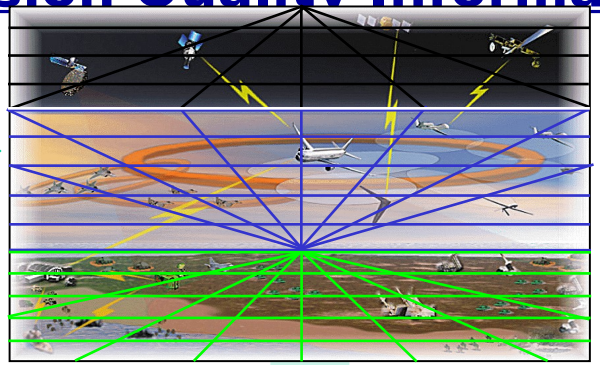
Constellation Attributes

- Effects-Based Air, Ground, Space, and IW Operations
- Dynamic Execution
- Continuous PBA
- Collection Optimization
- Sensor / UAV Control
- ISR Visualization
- Combat & Target ID
- Horizontal Integration
- Machine to Machine
- Full Spectrum Comm

Decision Quality Information



Intuitive Decision Making Environment

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Where We've Been

- ***BMC2 – Constellation Concepts "Information Campaign"***

- ✓ CSAF/CORONA
- ✓ Gen Handy
- ✓ Dr. Levis
- ✓ CAF Commanders
- ✓ SAB
- ✓ Legislative Assistants
- ✓ OSD
- ✓ Hydra / C2 Roundtable Lt Gen's Looney / Radegue
- ✓ JFCOM J-8 Maj Gen Dick
- ✓ JFCOM J-7 / SJFHQ BG Rogers
- ✓ Lt Gens Carlson / Hobbins
- ✓ Boeing BIC
- ✓ SAIC
- ✓ Raytheon
- ✓ L-3 Comm
- ✓ Lockheed-Martin
- ✓ Northrop-Grumman
- ✓ Netwarcom
- ✓ PEO Strike Forum
- ✓ JFCOM J5

- **Concept of Operations (CONOPS)**
  - **CONOPS at CSAF **** level**
  - **Trifold / Briefing**
  - **BMC2 White Papers**
- **Capabilities Documentation (ICD)**

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Closing Thoughts

- Joint Terms, lexicon, framework, architecture, tools…. critical
  - Services then frame our efforts via joint framework
  - Services (able to) brief each other's BMC2 efforts ????
- Determine what (if anything) should be true joint acquisition (e.g. NCI components)
- APPLY commercial technology & standards, do NOT reinvent…
- C2 is a people business – Integrating people & powerpoint is key
- Lots of parallel "architecture efforts" ongoing
  - Integration amongst them???
- Employ toolsets unto ourselves (BMC2 developers)
  - E.g. Use a CIE / repository mechanism for our JBMC2 efforts
- Determine "Lanes in the road" amongst
  - Joint, DISA, Services, MDA, JTAMDO, OSD/C3I, OSD/AT&L…
- JOINT broad level ACTD / exercise consideration…..
  - C2C, FORCEnet, Objective Force / FCS…….